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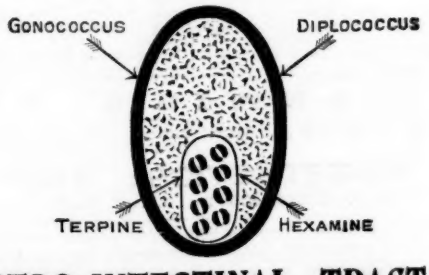

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BY ARTHUR J. HALL, M.A., M.D. CANTAB., F.R.C.P. LOND.,
PROFESSOR OF MEDICINE, UNIVERSITY OF SHEFFIELD.

LADIES AND GENTLEMEN,—Cholelithiasis is very common. Its treatment is, at present, entirely surgical and outside the province of clinical medicine. I shall therefore confine my remarks to some of the problems connected with diagnosis, ætiology, and prognosis, which are constantly presenting themselves to every practitioner of medicine.

It is instructive to consider how greatly the diagnosis of gall-stones has been facilitated during the last 30 years. This we owe almost entirely to abdominal surgery.

For example, I was recently asked to see a married woman of 50, who gave a typical history of biliary colic for 23 years. When I saw her it was obvious that she was suffering also from malignant disease and had a hard gland behind the left sterno-clavicular articulation. Her husband did not believe my diagnosis, as he had been told exactly the same thing 23 years before by another consultant when his wife first began to have her pain. As this consultant was still in practice it was suggested that he should be called in again and asked to bring his old notes with him. This he did and read out to us a description which nowadays would suggest a typical attack of biliary colic. Yet 23 years ago the question of gall-stones was put aside in favour of malignant disease. The patient died a few weeks later of abdominal carcinoma.

The fact is that the gall-stone complex, as we know it now, was not at that time common knowledge.

JAUNDICE NOT AN ESSENTIAL SYMPTOM.

In considering the symptoms due to gall-stones the first point I would lay stress upon is that jaundice is not, as is often supposed, an essential symptom. The anatomy of the gall-bladder and bile-ducts shows that since the gall-bladder is a cul-de-sac branching off by the cystic duct from the main bile channel, there is no obvious reason why obstruction of this bile channel and consequent jaundice should occur so long as the stones remain in the gall-bladder. It is when they get out into the common bile-duct or when some catarrhal changes arise which block this channel that obstruction takes place. When present, however, jaundice is a valuable confirmation of the diagnosis.

Another point to remember about jaundice is that it is often so slight and so transient as not to be recognised even when it does occur. A full and complete yellowness of the conjunctiva and skin, known in the north of England as the "yellow jaundice," requires a certain intensity and completeness, and consequently a certain duration of obstruction. If a stone is expelled from the gall-bladder, slips back, or, being small, passes fairly quickly—say, in two or three hours—down the whole length of the common duct and out into the bowel, the obstruction to the bile flow which it produces during its passage may be insufficient to cause a recognisable deposition of bile pigment in the tissues. Inquiry, however, may show that after such an attack of pain the urine is rather highly coloured, and the patient is said to have been slightly sallow or a bad colour. These are points which should be carefully inquired into. It is also not uncommon to find a history of jaundice preceding the date of onset of pain by some years (see Postscript).

ABDOMINAL PAIN OR DISCOMFORT.

Of all symptoms abdominal pain or discomfort is the most common and the most important. Its position must first be considered. That it is usually and principally in the right upper abdomen goes without saying, and that it is by no means always limited to that region is familiar to all. Its most common direction of spread is round the body to the right and up towards the right shoulder, but it may vary in many ways. Sometimes it is quite misleading in its situation.

Thus, a man, aged 36, whom I saw in January, 1917, gave the following history. For four years he had pain between the shoulders, which was worse on waking and relieved by getting up. For one and a half years it had been more severe round the waist, worse on walking about. In the last attack it "left the stomach and went to the shoulders and down the arms." If he put his foot on anything rough on the ground whilst in the dark it doubled him up. When I heard his statement I must admit that the question of gall-stones did not occur to me. However, the condition was diagnosed later by one of my surgical colleagues and its presence confirmed by his subsequent operation.

Such a history emphasises the wide variations in area of pain which may exist.

As to the character of the pain, there is often much valuable information to be learned. In spite of the best intention on the part of the patient, it is quite extraordinarily difficult at times to get a true picture from his statements. The proper perspective can best be got by letting the patient talk on, often at somewhat wearying length. Some chance remark by the patient or by a friend who has been present during an attack often does more in confirming the diagnosis of gall-stones than any number of direct questions. This is really a form of psychoanalysis, and thus necessarily somewhat tedious and lengthy. If there is real colic of a typical kind the difficulty is slight. If, however, it is of less severity, and especially if the patient is of the uncommunicative type so common in the north, the difficulties may be great.

A case I saw quite recently will illustrate the kind of difficulty I mean. The patient, Mrs. X, was a stout pallid married woman of about 58. The history as given to me was as follows: She had suffered from "nervous dyspepsia" for ten years off and on. Two years ago she began to be worse with some constipation. She had pain after food, which increased by taking meat, and persisted for eight or nine hours after the meal. In December, 1919, she had pain irrespective of food. It would begin about 3 P.M. and last till 6 or 7 o'clock. Hot water or a little brandy relieved it, and also artificially induced vomiting. An examination of the abdomen at that time gave no tenderness and nothing abnormal was to be felt. The site of pain was vaguely referred to the upper abdomen. She was taken into a nursing home for further investigation, but nothing definite was made out. A test breakfast showed a rather large return, with much undigested solid; no reaction to Congo-red or tropæolin. No occult blood in fæces. An opaque meal showed nothing abnormal.

At that time there was nothing elicited which pointed directly to gall-stones. I did not see her again for six weeks, during which time the pain had not been severe, until ten days before my visit, when after two simple enemata she became collapsed and her doctor thought she would die. On this visit she told us, for the first time, that she had jaundice 12 years previously and that the doctor who then saw her said it was probably gall-stones. Further inquiry showed that the attacks of pain often came on quite suddenly, when she was feeling otherwise well, that they reached a maximum soon and passed off in two or three hours, and that after an attack she was often sallow and the urine rather dark. Examination elicited distinct tenderness over the gall-bladder region. Operation was performed by a surgeon a few days later and gall-stones were removed.

The points that I should lay stress upon as regards the character of the pain are: (1) Rather sudden onset, unexpectedly at any time of night or day; (2) rapid increase to acute severity; (3) duration of a few hours; (4) sudden decline in acute severity with more gradual decline of soreness; (5) tendency to follow unusual activity; (6) occasional but not constant relation to food. This kind of attack occurring in the night is not at all uncommon. My colleague Dr. A. E. Barnes, in discussing the diagnosis of duodenal ulcer at the Sheffield Medico-Chirurgical Society last session, laid down as an important axiom that "any abdominal pain which comes on spontaneously in the night should arouse suspicion of organic disease." I agree fully with that, and in my experience it is by no means uncommon in gall-stones. I also have records of cases in which attacks have been started by the jolting of long railway or motor journeys.

Complete freedom from pain in the intervals between acute attacks is always suggestive. In many cases, however, chronic discomfort—usually called indigestion—fills up most of the intervals. Tenderness over the gall-bladder region is usually found on careful examination. It is especially marked at or about the occurrence of an attack of colic, and may be constant.

THE PATIENT'S AGE AT ONSET.

In older text-books of pathology considerable stress is laid upon the frequency with which gall-stones were found at autopsy in elderly persons who had died of other diseases, and it was assumed that these had produced no symptoms during life. Such an assumption is, I think, not warranted. From what we now know of the varied symptoms which gall-stones may produce, it seems much more likely that in most, if not all, these cases symptoms of more or less severity did occur from time to time, but that as they were probably of a dyspeptic type their true cause was not suspected. Whether a person can have gall-stones for any length of time without any symptoms at all is doubtful.[1] It does not seem impossible; for we know that they may remain latent for long periods—ten years or even more. In every case, therefore, the question naturally presents itself as to how long have the stones been there? If they can remain latent for ten years there is no a priori reason why they should not do so for 20 or 30 or even more years. I raise this point because I am inclined to think that we are too apt to look upon gall-stones as a disease limited to middle life or later. This is certainly the teaching of our standard text-books, and appears to be the general impression. This view was chiefly obtained from statistics of autopsies at a time before operations for gall-stones were common, and deserves reconsideration in the light of more recent knowledge. The question is one of some importance because it leads sometimes to the wrong diagnosis of severe cases of biliary colic in young people, largely because of the youth of the subject. This particularly applies to persons between 15 and 30 years of age. At any age younger than 15 one must admit that gall-stones are very rare. Still,[2] in 1899, was able to collect only 20 cases in children under 14 years of age. Of these, 12 were in infants under 3 months; of the remaining 8 only 2 are recorded as having had colic. In 3, stones were passed per rectum, in 4 they were found post mortem. When, however, early youth and early adult life are reached my own experience makes me think that the condition must be more common than is generally supposed, and that it leads to mistaken diagnosis.

The following cases illustrate this point:—

CASE 1.—In 1905 I was called to see a single woman (C), 22 years of age, who was said to be suffering from floating kidney with Dietl's crises. There was a history of a bicycle accident several years ago, which was said to have started the trouble, and a fall from a horse in 1904, which had made it worse. She had a large loose kidney on the right side which was tender to touch. Acute attacks of pain kept recurring without vomiting or jaundice, but accompanied by flatulent distension. The diagnosis of floating kidney seemed correct at that time, and suitable means for supporting the kidney were adopted.

I did not see her again until 1913. The attacks of what was now called "indigestion pain," but was obviously her original trouble, had kept coming on at intervals and latterly getting more severe. Inquiry showed that the pain always began to the right of the epigastrium and went up to the right shoulder and back. One night her sister found her "curled up" with pain on the bedroom floor. When I saw her she was just getting over an attack, and there was great tenderness on the slightest palpation of the gall-bladder area. The kidney could still be felt and was sensitive to pressure, but relatively to the other tenderness this was negligible. Gall-stones were diagnosed and at operation several were found—one large one impacted in the cystic duct.

In this case, then, gall-stone colic had been overlooked and called "floating kidney" for over ten years. It is probable that the stones were present before she was 20.

CASE 2.—This was a single woman (E.), 25 years of age. I was asked to see her in July, 1911, when she gave the following history. Eight years before she had an attack of what was called catarrhal jaundice—that is to say, when 17 years old. Three years ago she had her first attack of abdominal pain. This pain was in the gall-bladder region and usually came on in the night. She was found to have a movable kidney on the right, which was diagnosed as the cause of her pain. From that time to the present much time and money had been spent on various kinds of "kidney belt," and many weeks had been spent in bed with the feet raised. For the last four weeks the attacks had been so frequent that she has had to be largely under morphia. There were many circumstances in this case which pointed strongly to gall-stones. She told us that the attacks used to come on absolutely suddenly and go off with equal abruptness. Again, they more than once followed the jolting of a motor-car drive, also there was the frequent occurrence at night in bed. It was suggested that the motions should be put through a muslin sieve for the next few days, and on the first trial a small, broken-up gall-stone was found.

[1] See Postscript.

[2] Still, G. F.: Transactions of Pathological Society, London, 1899, 1., 154.

Operation a few days later confirmed the diagnosis and removed the trouble permanently.

CASE 3.—A third case was seen in 1906 in a young woman (R.) aged 21 years. She was an ardent golfer and had suffered from recurrent attacks of abdominal pain for some years. For the last two and a half years these had become much worse; a swelling, thought to be the right kidney, was quite palpable below the umbilicus. The attacks were very acute, there was occasional vomiting, no jaundice, no fever. When I saw her she had just gone through a severe attack with much vomiting, during which tetany had occurred in the hands and feet on the second and third days. Food always made the pain worse. Between the attacks she was quite well. Laparotomy disclosed a large distended gall-bladder and gall-stones.

From the history it would seem that they had begun to give trouble when she was not more than 16; how much earlier they had been forming it is impossible to say.

SOURCES OF ERROR IN DIAGNOSIS.

In each of these cases the error was made of attributing the trouble to a "loose kidney," which was definitely present in two and absent in the third. Had these patients been women of 45 or thereabouts the diagnosis would probably have been made much sooner. It has been suggested that "floating kidney" with Dietl's crises may be a predisposing cause of gall-stones. My personal experience makes me suspect that many cases of "Dietl's crises" are cases of gall-stone colic from the first, in which the floating kidney is merely an accidental association.

In the next case no such difficulty as regards the kidney arose, but another factor—namely, hysteria—was allowed to interfere.

CASE 4.—The patient was a single woman of 25, of very hysterical type, with some vague history of sexual trouble earlier in life. She was admitted to the Sheffield Royal Hospital under my care in 1915, complaining of attacks of abdominal pain which had begun 15 months earlier. Hysterectomy had been performed a few weeks before the onset of this pain, but there was no definite information as to the reason for this. She was under observation in hospital for a month, and during that time had an attack which lasted several hours. In spite of the very obvious character of the pain a correct diagnosis was not made, and she was labelled "gastric neurosis." After returning home the attacks continued, and in January, 1917, I saw her again and suspected gall-stones. However, she did not feel satisfied and arranged to go into a well-known hospital in London. She was under the charge of one of the physicians there and seen in consultation by his surgical colleague, and they arrived at the conclusion that there was no evidence of gall-stones, but that the whole thing was a neurosis and operation inadvisable.

In October, 1917, I was asked to see her again whilst she was actually in an attack. There was then no doubt that she was suffering from biliary colic. In this case also the pain often came on in the night. Operation was performed and a large gall-stone was removed.

The exact notes taken by my clinical clerk on this girl's case in 1915 are as follows:—"The pain is of an aching character and starts under rib 7, right side, and gradually spreads round body in form of girdle pains, but always worst at the above region where it started: does not radiate to lower abdomen, but shoots up back to neck and head."

The description is so typical as to make the mistake in diagnosis almost incredible. It is accounted for by the fact that one is apt to forget that gall-stones do occur in young people, and secondly, that a highly neurotic person always runs the risk of organic mischief being overlooked. This is a point worth bearing in mind. The boy in the fable who called out, "Wolf! wolf!" was an undoubted hysteric. When the wolf actually did come, he suffered the fate which hysterical people often suffer in the clinical world: nobody believed him! The desire for notoriety and sympathy which filled his youthful hysterical mind has in his case been posthumously fulfilled. The next four cases are merely added to emphasise the point as to age.

CASE 5.—In 1909 I saw a typical case in a girl of 17 years. The attacks were characterised by intense pain over the gall-bladder, coming on absolutely suddenly at any time and passing off with equal suddenness in four to five hours. In the interval she was perfectly well. At operation about 20 very small stones were found. Possibly each attack represented the actual passage of a stone from the gall-bladder to the duodenum which occupied the above-mentioned time, and was too brief to cause jaundice. Probably the simple process of passing the motions through a sieve would have demonstrated the stones.

CASE 6.—In 1914 a single woman (C.), age 28, was admitted to the Royal Hospital suffering from abdominal pain. Her symptoms began when she was 15. The pain followed food at intervals varying from a quarter to one hour. An attack lasts from two to two and a half hours. She goes yellow after an attack. For the last 18 months they have been getting worse. Attacks may come on in the night. Her mother had similar attacks. The gall-bladder is palpable. At operation 351 small stones were removed from the gall-bladder. Assuming that the onset of symptoms corresponded with the first formation of stones, she had been laying down stones at the rate of about 45 per annum, or nearly one a week.

CASE 7.—A married woman (G.), aged 24, began to have attacks of biliary colic with jaundice after a confinement one year ago. At operation four small dark-brown masses were found in the gall-bladder.

CASE 8.—Married woman (V.), aged 29, had her first attack of colic five years previously. Frequent recurrence; has had many attacks in night. Operation; a large number of stones removed.

I have also gone into the question of age of onset from another point of view—namely, in connexion with the histories given by those suffering from gall-stones in later life; and it is surprising how often it is possible to get a history of vague but real abdominal discomfort dating from comparatively early adult life. The patients may tell you that the type of pain has changed, and the much more striking colic may only have begun years after the chronic so-called stomach trouble. In 30 of my cases in which the presence of gall-stones was demonstrated at operation the date of first onset of symptoms is carefully recorded as follows:—

Symptoms of gall-stones began under 20 years of age ...						4	11
"	"	between 20 and 25	"	"	...	4	
"	"	" 25 " 35	"	"	...	3	
"	"	" 35 " 40	"	"	...	7	
"	"	above 40	"	"	...	12	

The number of cases may seem insignificant, but they are the only ones in which the records, on this point of date of onset, are complete and the results of operation known. As regards age of onset, these figures give numbers which, if exceptional and accidental, at any rate show that gall-stones beginning in the period of life, 15 to 30, are by no means rare in these parts.

The Dangers of Declining Operation.

It is usual at the present time to advise operation in most cases of gall-stones. Although in many cases this advice is followed, usually with the happiest results, it is not uncommon to meet with patients who cannot make up their minds to undergo the ordeal of an operation. Thus, an active vigorous man, 70 years of age, whom I saw recently, was seized with a typical severe attack of biliary colic. He had had a similar attack 15 years before, for which morphia was required, and a slighter attack, which passed off in a few hours, one year ago. He declined operation absolutely and, to a certain extent I think logically, for he said: "I have managed to carry on for 15 years without a second severe attack. Why shouldn't I go for another 15 years without one?" I have quoted this case merely as an example of what is familiar to every medical man, and I want to consider how far this patient or any other similarly affected is wise or foolish in declining operation.

What becomes of patients who know they have gall-stones and elect to keep them? They escape thereby the discomfort and the dangers inherent to every major operation. What are the discomforts and dangers to which they expose themselves?

These may be summarised under three heads: (I.) Persistence or recurrence of pain. (II.) Inflammatory complications, leading to adhesions, ulceration, gangrene, &c., necessitating an operation of urgency under conditions of considerable gravity. (III.) The occurrence of cancer in the gall-bladder region. There is also the possibility of chronic pancreatitis with its usual train of symptoms. In order to obtain some data on these points I have gone carefully through my records of cases and followed up, so far as has been possible, those patients in whom the diagnosis seemed quite clear and who declined operation. In a few of the cases stones had been passed by the bowel; in all but three jaundice had occurred, often more than once. In all the history was typical. The actual number of cases which comply with these requirements is necessarily small, as in so many there is an element of doubt. I have been able to follow up the after-histories of 26 such cases during varying periods from 20 years downwards to two years. There were 9 males, 17 females.

The first of the three questions summarised above amounts to whether a person with gall-stones is likely to have increasing frequency of attacks of colic as age advances—that is, supposing no other complications arise. So far as my limited numbers go I am inclined to answer this in the negative. On general grounds one might expect that with the increasing calm of advancing age, and the absence of violent exercise, over-indulgence in food, and hurry, there would be less disturbance in the gall-bladder and fewer attacks.

AFTER-HISTORY OF CASES NOT OPERATED ON.

One case (Mrs. J.) had colic at the ages of 52, 58, 61, 62, and 64; she then had no further attack in her life and died of some unconnected disease at 72. So that for the last 12 years of her life she was free from attacks. A man (D. W.) had an attack when 68 and lived another 10 years without any further trouble and died suddenly. A woman (Mrs. T.) had colic attacks from the age of 61 to 64; she lived to 69, having no further attacks and dying of cerebral hæmorrhage. A man (Mr. L.) had colic during his fortieth and forty-first years he is still living at 48, and has had no further attacks.

A woman (Mrs. P.) had colic and passed a stone per rectum at 45 years of age; she has had no attack since—that is, 10 years later—and is in good health.

Woman (Mrs. J.) had recurrent attacks from 38 to 56 years of age. She is now 67 and has had no attacks for 11 years.

These are not many cases on which to dogmatise, but there is another side on which we have indirect confirmatory evidence. As was said above, in a considerable percentage of autopsies gall-stones are found in persons who have died of something quite distinct. In many of these there is no history of previous illness pointing to their existence. This may mean that they have never caused any trouble at any time, but more probably it means that during the later years of life they have not done so, and since the short memory of hospital patients is well known the symptoms of earlier years have been forgotten. Although the data thus obtained is scanty, I think we may say that it is not usual for gall-stone colic per se to get progressively worse in declining years.

The second danger to which the gall-stone owner is liable is inflammatory complications and ulceration. The relative frequency of these must be comparatively small and therefore the likelihood of their occurrence in any individual case not very great. There is, of course, a risk, and when it occurs, a very serious danger. Unfortunately it is very difficult in any case of gall-stones to know, until operation, whether one is dealing with a simple uncomplicated case or with a condition of affairs which may at any moment become dangerous. The case of Mrs. X. proved to be one of this kind. There was nothing in the history to make one suspect the severe and complicated condition found by the surgeon at operation. As a matter of fact, I am informed that she had, in addition to stones in the gall-bladder, one stone loosely impacted in the common duct, the gall-bladder was adherent to the liver and to the duodenum, and ulceration had taken place between gall-bladder and duodenum.

With such a condition as this, in what seemed a straightforward case, one can never feel safe in supporting the plea of no operation, however simple the case may seem. The patient is always running the risk of urgent danger.

CARCINOMA IN PATIENTS WITH GALL-STONES.

Lastly, there is the question of carcinoma. My inquiries show that of the 26 cases followed up 13 are still living, 8 have died of malignant disease of the abdomen, and 5 from other causes. Thus of these 26, no less than 8 have already died of abdominal carcinoma. How many of these were actually primary in the gall-bladder I cannot say, as autopsies were not obtainable, but some certainly were strongly suggestive of this.

It is useless to quote percentages in dealing with small numbers like this, but it shows, at any rate, that the possibility of a terminal carcinoma in cases not operated upon is considerable and real. This is, of course, a well-known fact. Rolleston, in his "Diseases of the Liver, Gall-bladder, and Bile-ducts," goes into the question very fully, and gives interesting statistics on the subject. These vary very widely from 4 per cent. to 14 per cent.

It is worth while, however, looking into the details of my cases as to when this occurred.

1	died at 68	after having had colic for 30 years.					
1	"	67	"	"	"	13	"
2	"	65	"	"	"	20	"
1	"	50	"	"	"	25	"
1	"	63	"	"	"	11	"
1	"	59	"	"	"	12	"
1	"	65	"	"	"	8	"

On an average these patients had suffered from colic for 17½ years before malignant disease supervened,

and their average age at death was nearly 63. Fütterer[8] gives the average age of primary carcinoma of the gall-bladder in a large series of cases as 58 years, and Winton in a series of 60 cases agrees with this. One cannot, therefore, say that the occurrence of carcinoma of the gall-bladder is likely to be an early result of gall-stones. In fact, it might be said that in such persons carcinoma comes on at about the same period of life as in other persons, but its place of selection seems to be the gall-bladder.

CONCLUSIONS.

As I said at first, cholelithiasis is very common, and it is almost certain that the number of cases in which this condition is the cause of vague abdominal pain is even greater than is generally realised. I feel sure that in doubtful cases we neglect too much the simple method of examining the fæces by straining them through muslin after an attack of abdominal pain. It is not very troublesome, and if, as so often happens, small stones are being passed, their detection in the fæces settles the matter at once. There is every likelihood that in some few cases all the stones in the gall-bladder are eventually passed in this way and complete recovery thus occurs without operation, but this is probably a rare method of cure. A few months ago I saw an instance of this in a woman who began with severe biliary colic when 25 years of age. This recurred every month or two for ten years. The pain was so intense that the doctor was always obliged to give her a few whiffs of chloroform to relieve her until he could get his syringe ready and the morphia injected. After each attack she strained the motions through a sieve and always found a small stone. I saw her collection of these, which filled a small bottle. She declined operation. From the age of 35 up to the present time—she is now 50—she has never had another attack or any discomfort of any kind, and I suppose she has passed them all. However, this is an exceptional experience and cannot be offered as a probable result in most cases.

I think, therefore, that it is our duty to urge all those in whom the existence of gall-stones is fairly certain to undergo operation, unless there is some strong contra-indication. Although their pain may be tolerable, and perhaps only intermittent, yet it is impossible to judge how far dangerous inflammatory complications already exist, or how soon they may arise, whilst the possibility of malignant disease ending the scene is a very real one, although this may be delayed for many years.

Postscript.—Since this lecture was delivered I have seen two cases bearing upon points emphasised in it. One of these was a man of over sixty years of age, who began with abdominal pain and jaundice. He was quite certain that he had never before suffered from abdominal pain or discomfort of any kind, and in this he was confirmed by his medical attendant. This complete absence of previous pain, together with the persistence of pain and jaundice at his age, made the diagnosis of malignant disease seem probable. He was eventually operated upon, and I am informed that a stone was found impacted in the common duct and nothing else. Unfortunately he only survived the operation a few weeks. It is, of course, impossible in such a case to form the least idea as to how long the stone had been in the gall-bladder absolutely quiescent. The second case was another example of gall-stones in a young woman. She was 32 and had suffered from attacks of colic for eight years, since she was 24. The interesting point was that she had suffered from an attack of jaundice at 11 years of age. Operation showed a large number of small stones.

[8] Rolleston: Diseases of Liver, &c., p. 641.

PORTSMOUTH WAR MEMORIAL: GIFT TO HOSPITAL.—At a meeting of the Portsmouth War Memorial Fund Committee held on Sept. 13th it was stated that the fund amounted to £21,100. It was decided to allot £10,000 to the Royal Portsmouth Hospital and to hold over the remainder for the erection of a suitable cenotaph, the cost of which was estimated at approximately the same figure. Any balance remaining is to be given to the hospital.

The Lumleian Lectures

ON THE

CLINICAL EXPERIENCES OF A PHYSICIAN DURING THE CAMPAIGN IN FRANCE AND FLANDERS. 1914–19.

Delivered before the Royal College of Physicians of London

BY SIR JOHN ROSE BRADFORD, K.C.M.G., C.B., M.D., F.R.S., F.R.C.P.

LECTURE III.*

MR. PRESIDENT, FELLOWS OF THE COLLEGE, AND GENTLEMEN,—In my previous lectures I have brought to your notice some of the diseases that were met with during the campaign, and discussed some of the clinical problems presented by these; to-day I propose to deal with some of the effects produced on the chest by gunshot wounds. Chest lesions are seen not only as a result of gunshot wounds of the chest, they may also occur as a result of gunshot wounds in other and even distant parts of the body. Gunshot wounds of the chest produce many effects that are of great interest from the medical side, and in this lecture I propose to deal mainly with but one side of the question—i.e., that dealing with certain physical signs that are frequently to be observed in such cases.

LESIONS RESULTING FROM WOUNDS OF THE CHEST.

Wounds of the chest are usually classified as either penetrating or non-penetrating, and one of the most striking facts observed is that the effects produced by these very different wounds are not uncommonly very similar, and hence it may sometimes be extremely difficult to determine with accuracy whether a given wound is a penetrating or a non-penetrating one. Gunshot wounds of the chest may give rise to a great variety of lesions, such as hæmothorax, sterile or infected, pneumothorax, open or closed, sterile or infected, pneumohæmothorax, pleurisy, empyema, hæmatoma of the lung, massive collapse of the lung, rupture of the diaphragm, lesions of the pericardium, or of the heart or great vessels, &c. Further, chest wounds may be single or multiple, but I propose in this lecture to limit my remarks in the main to the consideration of the effects of unilateral wounds in the production of the condition known as massive collapse of the lung, and only to deal with other lesions in so far as is necessary in order to elucidate massive collapse.

Unilateral wounds of the chest may give rise to either unilateral or bilateral lesions. When unilateral they may be on the side of the wound—i.e., homolateral—or else on the opposite side—i.e., contralateral. When an unilateral wound causes either unilateral or bilateral lesions, these may be direct and immediate or else indirect and remote, and therefore really of the nature of complications, and then they may occur either early in the history of the case, as in certain cases of contralateral massive collapse, or else at a later period, as in the case of bronchitis or pneumonia occurring as well-recognised complications in cases of hæmothorax, &c.

Chest lesions may also be seen as a result of gunshot wounds, not of the chest, but of other and, it may be, distant parts of the body, and here also they may be either of direct or indirect origin. Thus, a wound of the face, arm, or even of the buttock may give rise to a hæmothorax by the injury inflicted by the actual track of the missile. In this case the lesion is of direct origin, and if, as is sometimes the case in wounds of the face or arm, the wound of entry is small and there is no wound of exit, the nature of the case may be overlooked at first and the chest lesion attributed not to its real cause—hæmothorax—but to some other condition—e.g., pneumonia. These cases of chest injury as a direct result of wounds in distant parts of the body are of some clinical interest owing to their diagnostic difficulties and as illustrating the often remarkable course taken by missiles in the body, but they do not present the problems that arise in cases where the distant wound leads to the development of chest lesions in an indirect manner.

* Lectures I. and II. appeared in THE LANCET, Sept. 11th (p. 535), and Sept. 18th, (p. 583), respectively.

In these cases the injury inflicted by the missile is limited to the part struck—i.e., abdomen, buttock, thigh—the chest is uninjured, and yet as a direct result of the wound a chest condition of considerable importance—i.e., massive collapse—develops.

Finally, wounds of distant parts of the body may give rise to chest lesions as a result of the development of complications, such as pneumonia, pleurisy, &c. It is evident from these considerations that the subject of chest lesions in gunshot wounds is very complex, and it is not surprising that considerable difficulty may be experienced in the correct interpretation of the physical signs in any given case.

LESIONS PRODUCED BY UNILATERAL PERFORATING WOUNDS.

Sterile Hæmothorax.

The study, firstly, of some of the lesions produced by simple penetrating wounds limited to one side of the chest, so-called through-and-through or perforating wounds, and, in the second place, the study of the massive collapse that may ensue as a result of non-penetrating wounds of the chest wall, form the subject on which I wish to address you to-day. The simplest and at the same time the most common lesion produced by a unilateral through-and-through wound of the chest is a sterile hæmothorax of varying amount.

Inasmuch as this lesion produces mechanical or physical effects somewhat similar to those seen in pleural effusion, it might on a priori grounds be assumed that the clinical picture and physical signs of these two conditions would be very similar if not identical. In both the essential abnormal condition is the presence of a variable but often large amount of fluid in the pleural cavity, and hence it might be thought that the physical signs of a sterile hæmothorax would be more or less identical with those recognised by all as characteristic of pleural effusion.

Differential Diagnosis.

A very small clinical experience of cases of hæmothorax is sufficient to show that this is not the case and that in reality the physical signs of the two conditions are very dissimilar.

In pleural effusion the classical and typical physical signs are the bulging of the affected side with impaired mobility, displacement of the heart, lack of resonance on percussion over the area of the effusion with skodaic resonance above it, diminished tactile fremitus, and weakening or absence of breath sounds with, in some cases, tubular breathing limited in its position and possibly accompanied by increased bronchophony and ægophony. If the effusion be a left-sided one diminution of resonance over Traube's space is a well-recognised and common phenomenon. Bulging of the affected side of the chest, together with weakened or absent breath sounds, and displacement of the heart are nevertheless the usual and outstanding signs of this condition. It is true that such signs may sometimes be present in cases of hæmothorax, but they are not the usual ones, and in my opinion are not the typical signs of a sterile hæmothorax. In a simple sterile hæmothorax of moderate or even of large amount the signs are rather as follows: The affected side of the chest is immobile and retracted to a greater or less degree, and notwithstanding the existence of this retraction the heart is displaced in a manner similar to that seen in pleural effusion—i.e., away from the retracted and affected side and towards the normal side. Well-marked retraction may be present when the hæmothorax is by no means small in amount—i.e., two to three pints. The retraction is not only obvious to the eye and capable of being measured by the cyrtometer, but is shown in another way—i.e., by the upward displacement of the diaphragm, which is a most constant and characteristic feature of cases of hæmothorax. This upward displacement of the diaphragm is readily detected on X ray examination, but in cases of left-sided hæmothorax it can also be determined by the increased area over which resonance can be elicited by percussion, and Traube's space instead of being diminished in area as determined by percussion is, on the contrary, greatly increased in the upward direction.

This criterion affords one of the most striking differences in the physical signs of the two conditions and in the earlier periods of the campaign was a common cause of errors of diagnosis. Further, the skodaic resonance in cases of hæmothorax is extremely well marked, and thus it may well be that in cases of quite considerable hæmothorax on the left side there may be little or no dullness on percussion over the chest anteriorly with the patient in the recumbent posture. X ray examination reveals not only the high position of the diaphragm but also shows that it is immobile. In other words, in hæmothorax the diaphragm and the chest wall behave in a similar fashion; they both assume a position diminishing the size of the pleural cavity on the injured side and they both become immobile.

Although this retraction of the thoracic parietes in hæmothorax is in such contrast to what usually obtains in pleural effusion, yet the displacement of the heart in the two conditions is similar; that is to say, the heart is displaced towards the healthy side, and therefore away from the retracted side. Whatever the mechanism is that leads to the retraction of the chest wall and to the upward displacement of the diaphragm it is one that does not cause the heart to be displaced towards the affected side. Further, if from any cause, a moderate hæmothorax with the usual signs described above undergoes a sudden increase, as may happen when infection rapidly involves a sterile hæmothorax, the heart may undergo a further displacement, and strange to say, the retraction of the chest wall on the affected side persist. If, however, the pleural exudate becomes quite large the retraction will disappear, and then the signs will closely resemble those of pleural effusion. The retraction of the chest wall is certainly not only a most constant but also a very remarkable feature of hæmothorax, and it is strange that space should be found for the pleural contents rather by displacement of the heart than by the bulging of the chest wall. The auscultatory physical signs of hæmothorax are also somewhat different to those commonly present in pleural effusion, in that tubular and even amphoric breathing are much more frequently heard, together with greatly increased bronchophony and extremely well-marked pectoriloquy. Such signs are frequent in hæmothorax and rather infrequent, although by no means unknown, in pleural effusion.

Finally, mention must be made of the fact that the retraction of the chest wall is sometimes much more marked locally, and more especially in the lower regions of the chest posteriorly.

It is, of course, understood that the above description refers to cases of simple hæmothorax produced by through-and-through perforating gunshot wounds, and where the actual injury to the chest wall is often exceedingly slight. The retraction of the chest wall is not dependent upon any smashing injury of the chest wall, nor is it associated with any painful condition of the parietes. It may be seen in cases where the wounds are so small as almost to escape observation.

Causation of Differential Physical Signs.

When we consider the above physical signs, and more especially the retraction, the absence of bulging of the chest wall, the well-marked tubular or amphoric breathing, and the presence of pectoriloquy, together with the presence of some pyrexia and bloody sputum, it is not surprising that the presence of hæmothorax was often overlooked and the diagnosis of so-called "traumatic pneumonia" made in its stead. It was difficult to realise that the above signs were really indicative of the presence of blood in the pleura and not of pulmonary consolidation.

Post-mortem examinations showed that inflammatory complications such as pneumonia practically did not occur in lung tissue collapsed under the pleural effusion present in hæmothorax, although such complications might occur as a result of wounds where no hæmothorax was present. In other words, the presence of hæmothorax in some way prevented the development of such inflammatory complications as pneumonia or bronchitis in the collapsed lung, although such complications might occur in other portions of the lung not collapsed by the hæmothorax, either on the same or on the opposite side. The results obtained by the study of these port-mortem findings and the clinical phenomena described above led to the conclusion that the physical signs produced by a sterile hæmothorax of simple production and of moderate amount—e.g., two to three pints—were in reality totally different to those found in an ordinary acute pleural effusion of similar size, and then the question naturally arose as to the reason for this difference. The presence of such marked retraction of the chest parietes and the high level of the diaphragm suggested the question whether the collapse of the lung found post mortem was really produced by the presence of the extravasated blood and fluid exudate in the pleural cavity, or whether it had some other origin. If the extravasated blood in hæmothorax solely produced the collapse of the lung it was not obvious why the signs should be different to those of pleural effusion; if the collapse had some other mode of origin it might perchance afford some explanation. A simple explanation that presented itself was that the gunshot wound led at once to collapse of the lung on the injured side by producing a pneumothorax that was only of transitory duration, and that the blood was extravasated after the lung had already collapsed. This seemed plausible and capable of accounting for the extensive collapse of the lung often found to be present. Such a view, however, was soon shown to be

untenable, as the same phenomena were found to occur in cases of non-penetrating wounds; and further, as will be seen later, it was also negatived by the occurrence of massive collapse of the contralateral type as a result of non-penetrating wounds of the chest wall.

Further clinical observation revealed, however, two types of cases that must be discussed in order to attempt to grasp the nature of the collapse of the lungs that results from gunshot wounds of the chest.

In the first type of case a unilateral penetrating wound causes the development of the following clinical picture. Physical signs are found on the injured side, such as immobility, dullness on percussion, absence of breath sounds, retraction over not only a very large area, but not uncommonly implicating the whole side, so that dullness is present up to the clavicle. In other words, the signs suggest at first that a very large effusion, filling the pleural cavity, is present, but more careful observation reveals that the displacement of the heart is either absent or else that it is somewhat misplaced towards the affected side, and that the patient, although presenting these extensive signs, is not always greatly distressed. If paracentesis be at once performed only a small quantity of fluid, it may be but a few ounces, is withdrawn. With or without paracentesis the signs clear up rapidly, sometimes in a few days, and cases have occurred where paracentesis had been ordered but postponed for some reason for 24 hours, and then when about to be done the signs had so altered that it was unnecessary. X ray examination, together with the results of paracentesis and of clinical observation, revealed that there were cases of quite small hæmothorax associated with extensive massive collapse of the lung quite out of proportion to the amount of fluid extravasated in the pleural cavity.

The results at this stage of the inquiry may be summarised by stating that it seemed that in simple penetrating wounds causing sterile hæmothorax the collapse of the lung was not directly and solely dependent upon the quantity of the extravasated blood and fluid in the injured pleural cavity. Cases were seen where the collapse involved the whole lung on the affected side and yet where paracentesis, X ray examination, and the clinical course of the case showed conclusively that a large extravasation was not present in the pleural cavity. These cases, however, present many difficulties in their interpretation, as it is obvious that a penetrating and perforating gunshot wound may give rise to many lesions of the lung that can only be surmised and not ascertained with certainty, and thus the interpretation of the massive collapse observed in such cases is open to question. For this reason we will now turn to the consideration of the second group of cases alluded to above—i.e., to the study of certain clinical phenomena the result of non-penetrating wounds of the chest.

CLINICAL PHENOMENA RESULTING FROM NON-PENETRATING WOUNDS OF THE CHEST.

Non-penetrating unilateral chest wounds may give rise to lesions of the thoracic contents either on the side injured (homolateral) or on the opposite side (contralateral). The homolateral lesions are essentially of the same character as those seen in penetrating wounds and will not be considered here as they also are often difficult of interpretation, inasmuch as it may in any given case be difficult to prove that the wound is not a penetrating one. The contralateral lesions are for our present purpose much more suitable as no such questions arise in these cases.

A non-penetrating wound of the chest wall of quite simple character, not producing any extensive local injury, may nevertheless produce a massive collapse involving the whole of the lung on the opposite and uninjured side. I wish, Mr. President, to emphasise the fact that such wounds are often very slight—i.e., certain wounds without the presence of any fracture of ribs and without the presence of any signs or symptoms pointing to damage of the thoracic contents on the side injured. Thus, such cases may not only show no physical signs of pleural or pulmonary lesions on the side injured, but they may never have suffered from hæmoptysis, a common symptom in non-penetrating chest wounds. In one of the most typical cases of massive collapse of this contralateral type that came under my observation the man walked four miles to the dressing station after being wounded, and the bullet dropped out when taking his tunic off. He had no hæmoptysis and no serious symptoms of any kind, yet massive collapse of the whole of the opposite lung was present within 24 hours of his being wounded.

Massive Collapse of the Lung.

These cases of massive collapse of the contralateral type, produced by non-penetrating wounds of the chest, are in many respects the most suitable variety for the clinical study of the condition since some of the ætiological factors usually regarded as necessary for its production are not present in such cases.

Thus the injury is not of necessity a severe one and the patient has not been compelled to assume a constrained posture, and sometimes, as just mentioned, has not even been in bed or lying down for a long period prior to the onset of the collapse. Further, there is no injury of any kind on the side of the collapsed lung, and nothing in the history to suggest obstruction of the bronchus by blood clot or foreign body; and it is difficult to see how such an obstruction could be present as a result of slight non-penetrating wounds of the opposite side of the chest. Lastly, but by no means of little importance, no anæsthetic had been administered to such patients prior to the onset of the massive collapse. It would seem evident, therefore, that these contralateral cases arise in some manner as a direct result of the injury to the chest wall. Although this variety of massive collapse is perhaps the one with the most striking clinical picture and the one where clinically there is the least difficulty in its recognition, there are many other forms of collapse after gunshot wounds. Thus it may be seen in a homolateral form after both penetrating and non-penetrating unilateral wounds, but in both of these there may be much more difficulty both in the diagnosis and in determining with any accuracy whether obstruction of the bronchus from a foreign body is present. Thus, in non-penetrating wounds bruising of the lung and the development of a hæmatoma of the lung are not uncommon. In penetrating wounds it is very difficult to determine clinically the part played in the production of collapse by the mere presence of fluid in the pleura. Although, as described above, massive collapse quite out of proportion to any fluid present can in some cases be diagnosed with accuracy and confirmed by X ray examination and by the clinical course of the case, yet this is only done with ease in cases of very complete and extensive collapse. In the more usual type of case it might seem far fetched in any given case to suggest that the collapse was excessive in amount and out of proportion to the quantity of fluid present in the pleura. It is for such reasons that in order to demonstrate with ease and certainty the presence of massive collapse the contralateral type following non-penetrating wounds of the chest wall should be selected.

Massive collapse is seen, however, under other conditions; it may occur not only as a direct result of gunshot wounds of the chest, but also indirectly as a complication. Thus it is by no means rare as a contralateral complication in cases of unilateral hæmothorax, although in such cases it is often overlooked or else diagnosed as pneumonia. Its occurrence as a complication of unilateral hæmothorax is one explanation of those cases where there is extreme displacement of the heart, suggesting the presence of a large collection of fluid in the pleura, and where paracentesis, &c., actually shows that the amount is small. In such cases the heart is displaced not by being pushed over by the pleural collection but owing to the existence of massive collapse on the side towards which the heart is displaced. This contralateral collapse occurring as a complication of hæmothorax is very readily confounded with contralateral pneumonia, since in collapse such signs as well-marked tubular breathing, pectoriloquy, râles, &c., are, if anything, better marked than in pneumonic consolidation. The distinguishing feature between the two conditions is the displacement of the heart, but in such cases as we are now discussing it is probable that the cardiac displacement will be attributed entirely to the hæmothorax, and thus the error of diagnosis made. It is probable that in certain rare instances massive collapse may occur as a complication of hæmothorax on the same side as the hæmothorax and involve the remaining free portion of the lung. I have seen a very few instances where from the signs and symptoms it was probable that this had occurred, but the diagnosis of such a condition and the separation of it from an increasing pleural effusion is a clinical problem of some difficulty, and I do not propose to dwell on this very rare group of cases.

There is, however, another group of cases of massive collapse of considerable interest where the condition is found in association with gunshot injuries of other, and it may be distant, parts of the body. Wounds of the abdomen may be followed by the development of massive collapse, and such cases resemble those described in civil practice by our Fellow, Dr. W. Pasteur.

In such cases the ætiology may be complex, just as it is in the cases of civil practice where the collapse develops after an operation for hernia or for appendicitis, and I do not propose to discuss them here. Wounds limited to the abdominal wall, and by no means of a severe character, may also lead to the development of massive collapse, and here also it may be on the side of the chest opposite to the abdominal wall wound.

Some of the most marked instances of massive collapse that I have seen occurred as a sequel to wounds of the buttocks, and in some cases of wounds of the thigh. In all these cases the wounds were of a severe type; in the case of the thigh, fracture of the thigh was always present; and in the case of the buttock wounds, although bone injury may not have been present, wounds were always of a severe type. In all these cases where buttock or thigh wounds were present the character and position of the wounds were such as to cause great distress to the patient, and they also caused great constraint of postures. This may well have played a part in the production of the lesion. No case of massive collapse of the lung came under my observation where the wound was one affecting either the upper limb or the head.

Physical Signs of Massive Collapse of the Lung.

The physical signs present in cases of massive collapse are very definite, although they vary necessarily with the extent of lung involved in different cases, and also with the degree to which any given area of lung involved is affected; hence they not only vary in different cases but also in one and the same case at different times—i.e., at different stages in its progress. It is probable that two, if not three, stages may be recognised, and for the reasons mentioned above the signs will be described in the simplest type of case—i.e., that of massive contralateral collapse in cases of non-perforating unilateral wounds of the chest wall.

In such a case the physical signs in the first stage are retraction and immobility of the side affected, high and immobile diaphragm on the affected side, and displacement of the heart towards the affected side. The displacement of the heart is extreme; thus, if the left side be the one affected the maximum impulse may be in the mid-axilla, or, if the lesion is on the right side, the impulse may be well felt in the right nipple line. When the collapse involves either the whole lung or the upper lobe the displacement of the heart, instead of being a purely lateral one, is oblique, so that the impulse is displaced upward as well as laterally. In left-sided cases of this type the impulse may be well felt and seen in the third left space or even behind the third rib. It is remarkable that these extreme displacements of the heart are, so far as my experience goes, unaccompanied by any murmur, either basal or apical.

All cases of massive collapse present the above physical signs and only vary in the degree of their development, but the other physical signs may vary according to the period in the development of the condition at which the patient is examined. If seen early, and where the collapse involves much lung and to a considerable degree, the percussion note will be impaired or dull, the tactile fremitus deficient or absent, and the breath sounds either very weak or inaudible.

These signs, together with the retraction and cardiac displacement, are characteristic of the first stage—i.e., in cases seen early and where there is extensive and marked collapse. It is of importance to recognise that in such cases the extreme displacement of the heart is the outstanding physical sign, and were it not for this the weakening of the breath sounds and the retraction of the side might either be overlooked or not attract the attention they deserve. Such cases are often difficult of interpretation if massive collapse, as a possible cause, is not present to the mind of the observer. This first or early stage may readily be overlooked, as frequently such patients have no severe symptoms, and unless the position of the impulse is noted the existence of the collapse is not recognised.

In the second stage the physical signs are more obvious, and the bulk of cases seen come under observation at this stage, when the heart is still extremely displaced, the chest retracted, the diaphragm high, but the breath sounds, instead of being weak or absent, are tubular or amphoric in quality, and tactile fremitus is increased and pectoriloquy extraordinarily well marked. The loud character of the tubular or amphoric breathing, together with the presence of whispering pectoriloquy, causes such signs to be frequently interpreted as pneumonic in origin. In these cases the retraction of the chest wall, although present, may not be so marked as in the first stage, and similarly the immobility of the chest may be also relative rather than absolute.

In the third stage of massive collapse the displacement of the heart is less, as the heart is returning to its normal position numerous râles and crepitations may be audible over the pulmonary area where tubular breathing, but less marked, is still audible. It is of some interest that an area of tubular breathing may persist for some days after the heart has returned to its normal position.

Such, then, are the signs of massive collapse, and the extent of their development in any given case will depend on the area of lung involved and the stage at which the patient is first seen. Massive collapse may involve the whole of one lung or the whole of one lobe or only a portion of a lobe. When it is lobar the lower lobe is the one most usually involved, but some cases of collapse limited to the upper lobe have been observed. Collapse involving the entire lung on one side has only been observed by me as a sequel of non-penetrating wounds of the chest wall, or else in association with a small hæmothorax; in the former case it was contralateral, in the latter homolateral. In other words, the contralateral massive collapse seen as a complication of hæmothorax has been either lobar in distribution or else has only involved a portion of one lobe. It is, of course, not probable that a patient could survive if suffering from a hæmothorax and massive collapse involving the entire lung on the opposite side.

Although contralateral massive collapse is not an uncommon accompaniment or complication of hæmothorax I have seen no case of massive collapse as a complication either of pleural effusion or of pneumothorax, notwithstanding the fact that a considerable number of cases of pneumothorax, the result of gunshot wounds, came under my observation. It would seem, therefore, that it does not arise as a complication of chest injuries or diseases when these are of more or less gradual origin as in pleural effusion, or, when, as in pneumothorax, their onset is marked by urgent dyspnœa.

Diagnosis.

The diagnosis of massive collapse is often difficult, more especially if the condition is not one familiar to the observer, and there can be little doubt that many cases are overlooked and regarded as of pneumonic origin.

Thus, from time to time cases are recorded in medical literature as cases of pneumonia of a peculiar character, in that the heart is displaced *towards* the pneumonic lung and where the symptoms of the patient are not such as to suggest the presence of pneumonia. When the massive collapse involves either an entire lobe or the entire lung curious errors of diagnosis are likely to be made. Thus I have known the condition mistaken for transposition of viscera in a case where after a contour wound of the left side of the chest the impulse was in the right nipple line and where the trivial symptoms present seemed to negative the possibility of collapse involving the entire right lung. Nevertheless, the progress of the case proved that this was really the nature of the case. The displacement of the impulse is sometimes attributed to cardiac dilatation, the physical signs at the left base being either overlooked or else attributed to compression of the left lower lobe by the supposed cardiac dilatation. I have known the sound normal side of the chest to have been opened under the impression that the displacement of the heart must have been due to some condition such as fluid, notwithstanding the absence of physical signs, the physical signs on the affected side being entirely overlooked or attributed to compression of the lung by the displaced heart. Further, operations have sometimes been performed on the affected side and the collapsed lung explored under the impression that the well-marked tubular breathing and râles indicated the presence of an intrapulmonary abscess. The most common error, however, is to attribute the signs present to pneumonic consolidation. This error can only be avoided by a consideration of the signs as a whole and by laying due stress on the cardiac displacement and on the absence of the symptoms of pneumonia. In most cases the diagnosis can be made with accuracy provided that it is recognised that such signs as tubular breathing are not necessarily evidence of pneumonic consolidation. In a few cases grave difficulty may be experienced because pneumonia may occur as a late complication in a collapsed lung; in such cases diagnosis would be very difficult, if not impossible, unless the patient was under observation prior to the onset of the pneumonia and when collapse alone was present. The massive collapse seen as a sequel of gunshot wounds is not,

as a rule, accompanied by urgent symptoms, and one of its most striking features is the absence of severe symptoms, notwithstanding the presence of very extensive physical signs. This may afford considerable help in diagnosis. Symptoms such as cough, dyspnœa, &c., would seem to be more marked in the post-operative variety of the affection seen in civil practice, more especially after abdominal operations, and it may be that these cases are rather of a different type.

Complications.

Complications in the massive collapse following gunshot wounds are, on the whole, rare, but certain inflammatory complications may develop in the collapsed lung, such as pneumonia, purulent bronchitis, and sometimes pleural effusion.

In cases under observation it can be clearly ascertained that these are true complications in that they supervene on an initial condition of pure collapse, but if only seen after the complication has developed it is probable that their true nature would not be recognised. When a pleural effusion develops as a complication in a case of massive collapse very remarkable physical signs are produced in that the pleural effusion may cause a displacement of the heart, so that it tends to return to its normal position, the retraction of the chest still persisting. With the increase in the size of the pleural effusion the retraction of the chest wall diminishes and may disappear, and then the signs become similar to those of an ordinary pleural effusion. It is, however, of interest that for a time in such cases retraction of the chest may be present; room is found for the fluid not by bulging of the chest wall but by displacement of the heart. The occurrence of bronchitis as a complication of massive collapse is also of interest, as it is in marked contrast to the absence of bronchitis in lung collapsed beneath a hæmothorax, a point I have already alluded to in the earlier part of this lecture. I am under the impression that those inflammatory complications in massive collapse are more liable to occur in the cases of post-operative origin, and in those complicating severe gunshot wounds of the buttocks and thighs. I have not seen them in the cases of massive collapse following the slighter non-penetrating wounds of the chest wall, although the massive collapse present in these cases may be of the most extensive variety and involve the whole of one lung. In cases where death has occurred as a result of pneumonia involving a collapsed lung, it is of interest that on post-mortem examination the lung, although solid, is not of the large size usual in pneumonia. This is especially obvious where both the collapse and the subsequent pneumonia have been limited to one lobe.

Nature of Massive Collapse.

There are many difficulties in the way of any simple explanation of this remarkable condition, and more especially of the variety described above as contralateral collapse, the sequel of non-penetrating wounds of the chest. Collapse of the lung is so readily produced by anything obstructing the bronchial passages that it seems natural to invoke some such mechanism in these cases.

Where massive collapse in one or other of its forms occurs as a sequel to a penetrating wound it must necessarily be difficult to exclude the possibility of the presence of blood or other foreign body in the bronchi in any given case. In the case of non-penetrating contour wounds with no symptoms of any urgent character it would seem very unlikely that any such cause is operative, more especially in the contralateral cases. The practical question would seem to be whether the immobility of the thoracic parietes in these cases is the cause, and the pulmonary collapse the result, or whether the chest wall is immobile because the lung is collapsed primarily. In the absence of any evidence pointing to the presence of a foreign body in the bronchial passages, the only other mechanism would seem to be obstruction of the bronchioles by muscular contraction or pathological exudation. It is difficult to accept either of these possibilities to explain massive collapse involving an entire lung in the absence of any symptoms pointing to bronchial obstruction. Lesions of the smaller bronchi causing obstruction to the entry of air produce symptoms and signs of considerable urgency; in these cases these phenomena are absent. In cases where a patient is confined to bed or has to assume some constrained posture, the hampering of the full respiratory movements of the chest may lead to the retention of secretions in the bronchial passages, and so increase or perhaps produce some varieties of collapse; but such an explanation will not meet the cases of massive contralateral collapse. Impairment of the movements of the chest wall and of the diaphragm are, however, most important factors in causing collapse of the lung directly, as has been noted by previous observers, especially J. Pearson Irvine, and W. Pasteur. If the respiratory movements ceased on one side of the chest the lung on that side might collapse, if not by the "deflation" postulated by Pasteur, at least as a result of the absorption of the air in the lung by the circulating blood. There is perhaps no great difficulty in attributing massive collapse to loss of respiratory movement of the thoracic wall and diaphragm, and some of the facts I have brought to your notice would seem to suggest that the chest wall is not merely passive. Thus, in hæmothorax, where retraction of the chest wall may be well marked, the heart is displaced, as in pleural effusion, away from the affected side. It is difficult to understand how this comes about if the condition of retraction is not an active one. Further, in cases of massive collapse, when pleural effusion occurs as a complication, the heart undergoes the usual displacement. The difficulty is not that immobility of the thoracic parietes is not an adequate mechanism for the production of collapse, but rather that it is so difficult to understand how this condition should supervene on one side of the chest as the result of a more or less trivial injury to the opposite side. The condition of the chest wall presents some analogy to that of the abdominal wall in cases of injury or disease of the viscera, but it is doubtful whether it is more than an analogy and it would seem as if more experimental work is required before an adequate explanation of the phenomena of massive collapse can be given.

The study of these cases of massive collapse of the lung as the result of gunshot wounds suggests that collapse of the lung is a very common, perhaps the most common, result of a gunshot wound of the chest, although in a very large proportion of cases its presence is masked by the development of a hæmothorax. I am of opinion that this is the reason why the physical signs of a simple sterile hæmothorax are so often different from those of a pleural effusion. In the latter the collapse of the lung is produced gradually in association with the pleural exudate; in the former massive collapse of greater or less extent is produced more or less suddenly, and the hæmorrhagic effusion of the hæmothorax is only in part responsible for the collapse of the lung present.

ON THE

END-RESULTS OF PERIPHERAL NERVE INJURIES TREATED BY OPERATION.

(Being the substance of an introductory address to the Section of Surgery at the Annual Meeting of the British Medical Association.)

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IN civil life injuries to the peripheral nerves, although by no means rare, do not occur in sufficient numbers to allow of the collective investigation which they receive in war. Hence much of our earlier clinical knowledge was founded upon the work of Weir Mitchell during the American Civil War, and since that time research has been conducted mainly either on experimental or pathological lines or on the limited clinical opportunities of a few observers. The European war has again supplied us with a large amount of material, which has been thoroughly studied, and which has been treated under the most modern surgical conditions.

Great numbers of these cases have been submitted to the operation of secondary suture, and not a few to that of grafting, so that we may hope that it will be possible ultimately to express almost in a statistical form the end-results which have thus been obtained. This day, however, has not yet arrived, and a long period of time and a careful series of observations by neurologists and anatomists will be required for full investigation. We are thus not yet able to give a perfect picture of end-results; all that can be done is to collate some of the more complete records and to formulate what may perhaps be regarded as an interim report.

The Legitimate Limit of Hope.

It may now be agreed that the regeneration of a peripheral nerve is in all cases accomplished by the downgrowth of axons from the proximal end into

channels or sheaths awaiting them at the peripheral end. The proximal axon is connected with a sensory or motor neurone, while the peripheral sheath leads to, or is connected with, a terminal organ, either motor or sensory.

Apart altogether from anatomical continuity, it must be recognised that repair which may lead to a good functional result requires that a sufficient number of axons shall enter into a sufficient number of peripheral sheaths which are capable of leading them in the right direction. Thus, for example, motor axons entering channels connected with sensory terminals are probably lost for ever, and so with afferent axons which become connected with muscle-endings. So far as I know, the union of a purely motor with a purely sensory nerve is not followed by any physiological connexion whatever.

Clearly, motor axons must enter motor channels and afferent axons sensory channels. Not only is this the case, but it is important that as far as possible the down-growing axons should enter the identical channels for which they were originally intended. Thus, if the spinal motor cells for, let us say, the extensor longus pollicis become connected with the peripheral channels for the brachialis anticus, which lie in the same nerve, physiological confusion will result, and the spinal cord will not be able to produce the movements which the brain demands.

Similarly, irregular connexion of afferent nerves with terminal organs in the skin or elsewhere for which they were not intended will necessarily lead to more or less of chaos in the interpretation of afferent impulses. No doubt errors of this type can be to some extent corrected by means of education, but such re-education will be necessary in the great majority of cases of nerve suture, and it is especially necessary in connexion with suture after the excision of large cicatrices from complicated junctions such as the brachial plexus.

Macroscopic and Histological Shunting.

We are thus brought face to face with the question of shunting, or, as the French call it, "aiguillage," of axons into peripheral channels. Shunting may be gross or macroscopic, as when the proximal end of the hypoglossal or spinal accessory nerve is attached to the distal end of the facial, in which case a limited physiological result may be obtained. Motor axons here enter channels for which they were not intended, and the resulting movements are confused and imperfect, but they can and do occur.

The gross shunting of a purely sensory on to a purely motor nerve or vice versa can produce no result at all. The operation which has been adopted in the past of implanting the two ends of a cut nerve into an intact adjacent nerve ignores altogether the essential linking up of original channels, and has in practice entirely failed. In this connexion I would urge that the word anastomosis, which is founded on a false analogy beween nerves and hollow channels such as blood-vessels, should be entirely abandoned. Anastomosis in the real sense of the term never occurs, and the use of the word is apt to lead to confusion of thought.

Apart, however, from gross or macroscopic shunting, histological shunting probably occurs in the vast majority of operations. In the case of end-to-end suture every endeavour is made to avoid errors in shunting by preventing rotation of the approximated ends; but even with this precaution some error probably always occurs, owing to the nerve fibres running in a spiral course, so that, however perfect the anatomical adjustment, the minute apposition is not likely completely to restore the axons to their original channels. To a much greater extent this difficulty arises when a graft has been interpolated. In such cases the axons of the proximal end are expected to enter the neutral channels of the graft, to pass through them, and then, so far as possible, to re-enter their proper channels at the other end of the graft. It is clear that under such conditions the prospects of correct shunting will be at least very greatly diminished, and that, even if good anatomical results can be obtained, the physiological results are likely to be most imperfect.

Economic Value of the End-result.

We have one other consideration of importance in judging of an end-result. Such a result can be anatomically good in the sense that nerve continuity is restored; it may be physiologically or neurologically satisfactory to the extent that on stimulating the nerve every muscle with which it is connected may be made to contract and the whole of its cutaneous distribution may present at least some sensation, but we have also to consider what I may call the economic value of the end-result.

A result which is neurologically good may be economically poor, in the sense that the patient is unable to use the affected part as he ought to do. Such defect may be due to psychical conditions, to the secondary changes of muscular atrophy or of arthritis, or possibly to a form of ataxia in which, while all muscles are capable of action, they can only be properly used while their action is under visual control. This local ataxia, which may render economically imperfect an otherwise excellent limb, is probably due to want of restoration of the deep afferent fibres by which are judged and controlled perfect muscular action.

Alternatively, and more fortunately, the economic result may be better than the physiological result. Thus in cases of injury to the ulnar nerve with well-defined symptoms, those who do not require the finer movements of the hand may find little practical inconvenience, and even a complete lesion of this nerve may exist without recognition by the patient. Again, vicarious movements may admirably replace those of lost muscles. How varied such vicarious movements may be and to what a degree patients may conceal paralysis which actually exists is well illustrated in a recent paper by M. F. Forrester-Brown.[1] Vicarious movements and substituted movements of this type have an enormous economic value, but they constitute a veritable pitfall in the estimation of neurological results for those who are not constantly upon their guard or not thoroughly familiar with the possibilities of misreading end-results. The importance of their consideration is illustrated by the fact that I have personal knowledge of cases reported by good observers as "cured" in which there is no neurological evidence whatever of regeneration; and it is never possible to rely upon the statements of patients as evidence that recovery has occurred after operation.

A Summary of Reported Results.

Turning to some of the more extensive series of reported results, they may be thus summarised:—

Of 108 personal cases of suture or grafting analysed by Tinel,[2] 14 were complete failures, 22, or say 20 per cent., showed practically complete recovery, and the remainder were regarded as improved.

S. W. Daw[3] says that 40 per cent. of his cases showed signs of returning motor power after seven months.

J. Sherren[4] found that of 21 cases of secondary suture some return of motor power took place in all, but that it was never complete.

R. Kennedy,[5] examining after a long period cases occurring in civil life, claims that 73 per cent. of all sutures were completely successful.

Dumas[6] investigated 115 personal cases of operation for war wounds of one nerve only, the musculo-spiral; but it must not be forgotten that for several reasons this yields better results than any other nerve. He claims evidence of recovery in 42 per cent. of his cases, and of some regeneration in 65·2 per cent., the remaining 35 per cent. being presumably entire failures.

J. L. Joyce[7] found in 36 cases of secondary suture 8 recoveries, 6 with considerable improvement, 8 with some improvement, and no result in 14.

H. S. Souttar and Twining[8] found that of 61 cases of

[1] M. F. Forrester-Brown: Brit. Jour. of Surg., April, 1920, p. 495.
[2] Tinel: Nerve Wounds, London, 1918.
[3] S. W. Daw: Orthopædic Effects of Gunshot Wounds, London, 1919.
[4] J. Sherren: Injuries of Nerves, London, 1908.
[5] R. Kennedy: British Journal of Surgery, October, 1918, p. 317.
[6] Dumas: Bull. et Mém. de la Soc. de Chir., June 5th, 1917.
[7] J. L. Joyce: British Journal of Surgery, January, 1919, p. 418.
[8] Souttar and Twining: Brit. Jour. of Surg., October, 1918, p. 279.

suture 7 recovered, 32 were recovering at the time of report, 7 were doubtful, 2 were failures, and 13 were not traced; but their results, like those of Joyce, would probably be improved by a later report, as in many cases the time elapsed had not been sufficiently long.

Adson[9] reports the results of operation on 41 cases, four-fifths of which were end-to-end suture and the remainder plastic operations. Of 30 cases traced "the average amount of improvement obtained was 58 per cent. return of the sensory, 62 per cent. return of the motor, and 67 per cent. return of the trophic function"; 73·1 per cent. showed improvement.

These figures, which are by no means easy to compare, leave the impression that secondary nerve suture gives very good results in somewhere between one-third and two-thirds of all cases, but the most careful study of original articles, as well as my personal experience, leads me to believe that a perfect neurological recovery is rarely if ever obtained. Permanent disability may be masked in various ways, but is almost invariably to be detected if carefully searched for. Complete failures are by no means uncommon, and must be looked for in a very definite percentage of even the best operations. Such appear to be the general results in the case of secondary suture.

Grafting as a Last Resort.

In the case of grafting, as we have already seen, much less is to be hoped for. Certain isolated cases are reported in which brilliant results are claimed, and it is, of course, possible that the anatomico-pathological difficulties to which I have referred may occasionally be overcome, but there is certainly as yet no large number of good results obtained from grafting. Personally I have no experience at all of this operation, and it will, I think, be found that the greater the experience of end-to-end suture the less often the need for grafting will be found to arise. So much can be done by bold operating, by extensive exposures, by thorough stretching of nerve trunks, by alteration of their anatomical course into a shorter bed, and by the operation of stretching in two stages that grafting will always be, and should always be, a last resort. I have yet to see personally any cases in which it has been a success. I have seen cases in which it has been reported as successful, but which to my mind did not carry conviction. I hope, however, that there are those present who will be able to establish a claim to have obtained results more fortunate than I have met with.

A number of facts now well established materially influence our prognosis in the case of different nerves and different levels of these nerves. Nerves which supply large muscles, and especially muscles of homogeneous type, such as the musculo-spiral, give much better results than those whose muscular distribution is small and complicated, such as the median and ulnar. Nerves also which are mainly motor or mainly sensory are more amenable to treatment than those whose function is more complicated. In both these cases, no doubt, the ill-effects of bad shunting bear more heavily upon the more complicated trunks. Dual lesions are more serious than single ones, so that a combined injury of the median and ulnar nerves is susceptible of very little improvement indeed.

Factors in Recovery: Time.

The time required for recovery is very great. On the basis of what is known as Tinel's sign the downgrowth of axons occurs at the rate of about 1 mm. per diem, which would require, say, 200 days for a fibre to grow from the wrist to the tip of the index finger, or two years from the middle of the thigh to the foot. The slow return of epicritic sensation, even after a perfect primary suture, is admirably indicated by Sherren's operation upon Head. An ophthalmic surgeon under my care some years ago divided the digital branches of his left middle and ring fingers near the web by a cut from a piece of glass, and did not obtain perfect tactile sense for 18 months or two years.

On the other hand, the rate of recovery is not in such direct proportion to the length of nerve to be traversed as was formerly believed, and probably a large share of the time actually occupied is required for the linking up of axons with end-organs and for re-education. In this connexion J. S. B. Stopford[10] has some most interesting figures; analysing 58 cases of suture of the musculo-spiral nerve in the lower, middle, and upper thirds of the arm he finds that the supinator longus begins to recover after about four, five, and seven months respectively, other muscles showing similar differences; so that it takes only about three months longer for recovery in a section close to the axilla than in the case of a section quite near to the origin of the branch for the supinator longus.

It would also appear from the work of Professor Stopford, who has most carefully tested 271 cases of nerve suture, that recovery is more perfect the nearer the suture is to the spinal cord, which may be due to its closer connexion with its trophic centre or to the greater ease of surgical operation upon thicker trunks.

Before concluding I should like to refer to the so far unpublished results obtained at the Grangethorpe Military Hospital in Manchester, staffed by old students of my own, with whose work I am thoroughly familiar. Most of the operating work here has been performed by H. Platt, and the results have been checked by Professor Stopford from a purely anatomical and neurological point of view. In a recent communication to the Royal Society of Medicine Professor Stopford states that in no cases of secondary suture can the result be described as perfect. At the best there has been a perceptible difference in power when comparing the two sides, and at least an incomplete recovery of epicritic sensibility, even three and a half years after the date of the suture. The recovery of sensation has been particularly disappointing.

Local Peculiarities.

Of sutures in the upper arm, failures amounted to 12 per cent., and in the forearm to 24 per cent. At both levels the recovery of voluntary power has been much less over muscles supplied by the nerve in the distal than in the proximal part of the limb. On the whole, it may be concluded that a good functional result is to be expected after secondary suture of the musculo-spiral nerve. The extensors of the wrist usually regain full power, the extensor communis digitorum recovers satisfactorily, but the extensors of the index finger and thumb are much less perfect.

As regards the median nerve, in quite a large proportion only incomplete recovery of protopathic sensibility has occurred, and voluntary power in the abductor brevis pollicis has only been found in 45 per cent. The ulnar nerve is particularly disappointing, and the recovery of voluntary power in the small intrinsic muscles of the hand was exceedingly poor. On the other hand, from the economic point of view, it is interesting to note that many of these injuries to the median and ulnar nerves did not prevent the patients from obtaining employment. I do not propose to weary you with details in reference to the nerves of the lower limbs.

These remarks apply to cases which date back for a period of three years; still further lapse of time may improve them, but will also tend to confuse the issue by permitting of improved vicarious function. As they stand they are, I believe, a perfectly fair expression of the best efforts of the surgery of to-day.

As to the dates at which recovery, if any, can be expected after the operation of nerve-grafting we have no reliable statistics, and the comparatively few records of such recovery which will even bear investigation are not numerous enough for generalisation.

Treatment of Nerve Compression.

In the treatment of compression of nerves my own experience has been very considerable, and almost, if not quite, uniformly successful. I have in the past had many examples of operation for compression of nerves, and I do not think that, however grave the symptoms, I have ever failed to obtain recovery which was at least economically complete; I have not the details to

[9] Adson: Annals of Surgery, August, 1919, p. 169.

[10] J. S. B. Stopford: Brain, vol. xliii., Part I., 1920.

show how far they were neurologically perfect. My personal experience thus differs sharply from that of Kennedy, who found that neurolysis yielded slightly less good results than nerve section and suture. I have only one reservation to make: after the removal of pressure by cervical ribs it is most rare for atrophy of muscles to be entirely repaired; this I am inclined to attribute to the fact that a chronic neuritis has followed the original pressure lesion, and that such neuritis leaves indelible changes which are rarely found in traumatic cases of pure compression.

I have not painted the picture in rosy colours; the greatest optimism is generally that of the man who records a few remarkable cases—often a single case. After many years I can only say that if a surgeon obtains 50 per cent. of really good economic recoveries after secondary nerve suture he is doing well; if he obtains 75 per cent. of such recoveries, which will bear investigation, his work is both brilliant and fortunate.

PROGNOSIS IN CERTAIN AFFECTIONS OF THE HEART.[1]

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To those who are suffering from affections of the heart prognosis is of the utmost importance. The parents of the boy whose heart was strained ask whether he may safely indulge in any form of athletics at school; others wish to know whether the condition of the heart will debar their son from entering one of the Services. The young man wonders whether the valvular heart disease for which he was invalided from the army is any bar to his intended marriage, or a life assurance company may desire to know his expectation of life. The anxious wife's first question is will her husband be spared, and he himself soon begins to inquire whether he can look forward to complete recovery, or whether he must needs relinquish all, or only some of, his former activities. To the physician prognosis is also an important problem because the treatment he recommends is often based not only upon a correct interpretation of the patient's symptoms and physical signs, but also upon a reasonably accurate forecast of the degree of health to which the patient may be restored.

It may be said that prognosis in heart disease is notoriously speculative and uncertain, and it is true that many intercurrent factors may arise and upset our most careful estimate of the patient's future. Nevertheless, there are certain general principles which we recognise as of the utmost value in guiding us to the knowledge that whereas one patient will make a complete recovery and another may look forward to some years of relatively good, though impaired, health, the life of another is fast drawing to a close.

Prognosis is primarily always dependent on accuracy of diagnosis. The precise data furnished by radiograms, the sphygmomanometer, the polygraph, and the electrocardiograph have placed diagnosis on a firm basis, and the co-relation of this knowledge with symptoms and physical signs has now become so well-established that in practice we can usually dispense with the electrocardiograph and other elaborate instrumental methods.

Cardiac Affections.

The prognosis in relation to cardiac affections is practically always more favourable if organic disease of the heart can be excluded. I do not hold with the theory which sought to minimise or to deny the unfavourable effect of organic valvular disease. Now, no one seriously believes that men with organic valvular disease are really first-class lives, or even that they are fit for military service in category A. It is true that some men with organic valvular disease are fit for a hard game of football, or for strenuous physical work, but these cases are exceptional. In the course of the acute endocarditis from which the patient suffered some years previously there were probably more focal inflammatory lesions in the myocardium than we suspected, and these must have left some permanent damage to the heart muscle. Consequently a chronic valvular lesion, apart from the mechanical disability it imposes upon the heart, thereby lowering its reserve force, is often associated with at least some degree of chronic myocarditis.

The prognosis, however, should never be founded solely on a study of the heart. We have to take into consideration the patient's age, sex, and occupation, the state of the arterial walls, the blood pressure, the efficiency of the kidneys, and the state of the pulmonary and other systems. Moreover, we have to remember that chronic degenerative changes due to spirochætal infection are slowly progressive, this being of particular importance in relation to aortic incompetence; whereas acute rheumatic lesions of the myocardium and endocardium are liable to recur, especially if the primary source of infection, whether it be in the tonsils or elsewhere, cannot be located and removed. Even after all the available data have been elicited and weighed we are reminded of the fact that no two cases are exactly comparable, and that each individual case must be judged on its merits.

I do not propose to enter upon the consideration of the phenomena associated with the patient's response to physical exertion, though this is of the greatest value in determining the functional state of the heart muscle, and consequently in ascertaining, for example, whether there is some degree of cardiac failure in addition to valvular disease. Nor shall I consider the symptoms and signs which collectively indicate pronounced cardiac failure, nor the prognostic significance of deficient renal activity in heart disease; but I shall limit my remarks to certain of the more common cardiac disorders which we encounter in the course of our daily work.

Dilatation of the Heart.

Let us first consider the prognosis in dilatation of the heart. I shall not deal with the dilatation which follows as a late and often terminal result of myocarditis, with or without valvular disease, but wish to speak of the cardiac dilatation which apparently ensues as a direct result of some unusual physical stress, or which is first recognised during, or in the early phase of convalescence from, an acute infective illness.

In regard to the former group of cases—namely, those usually spoken of as cardiac overstrain—it may safely be affirmed that physical exertion never causes a pathological degree of dilatation in a perfectly healthy heart. The recognition of this fact renders it difficult, or impossible, to give a wholly favourable prognosis to a patient suffering from cardiac overstrain, although the immediate prognosis may be good. The patient has usually attained an age which makes it almost certain that arterio-sclerosis has already begun, and we remember that age is a matter of tissue change, not merely of years.

The case of a joiner, aged 52, affords a good illustration. He was employed in a colliery, and enjoyed excellent health until he volunteered for the unaccustomed work of firing boilers during a miners' strike. Ten months later he was still breathless and fit for little work; the heart was preserving its normal rhythm, there was no dropsy, and no murmurs were audible, but the blood-pressure readings were high, the diastolic pressure being 85 and the systolic pressure 170, and after slight exertion the pulse-rate took four minutes to decline to its pre-exertion rate of 90. In such cases of cardiac overstrain the patient must be content to live on a lower plane of activity than formerly. He must avoid calling upon the heart, the reserve force of which is lowered, for more work than it can successfully undertake, and any physical effort which occasions dyspnœa, pain, or præcordial distress is harmful. The best advice to give to most of these patients is that which I learned from Cowan, of Glasgow—namely, that an active or a merry life will mean a short one.

In cases of cardiac dilatation from acute infective disease the chief difficulty centres in the question of

[1] A paper read before the Medico-Chirurgical Society of Edinburgh on July 7th, 1920.

diagnosis. The patient has passed through an acute febrile illness, often of rheumatic or influenzal nature, the heart has become slightly enlarged, the pulse-rate remains somewhat too frequent, and a systolic murmur has become audible. Has one of the valves been damaged by endocarditis or is the heart merely dilated? It is principally when the systolic murmur is maximal at the cardiac apex that we have to consider the possibility of its being an indication of recent endocarditis which, even although the immediate prognosis be favourable, will leave the mitral valve permanently damaged and will probably cause grave incapacity in the course of years. My own experience has taught me that an apical systolic murmur is almost certainly due, not to organic mitral incompetence, but to dilatation if the apex-beat is not displaced and not unduly forcible, if the murmur is soft in quality and confined to the apical region, if the intensity of the murmur varies notably with change of posture, and if the pulse retains its physiological respiratory irregularity. The conclusion thus arrived at is strengthened if the patient is anæmic, and if there is a functional systolic murmur at the pulmonary, and possibly also at the tricuspid, area.

In these cases of cardiac dilatation the prospect of complete recovery is good. The murmur may persist for weeks or months, but ultimately disappears entirely. It is now a frequent experience to find the heart perfectly normal in men who one, two, or three years ago were invalided out of the army because they presented a mitral systolic murmur which had led to a diagnosis of V.D.H. We are now observing on a vast scale the phenomena to which George Balfour drew attention in his classic observations on "curable mitral disease."

Disorderly Action of the Heart.

Passing to another common disorder, D.A.H., we recognise this as a symptom-complex, protean in origin, and by no means confined to those who have served in the army. When the man who was always a weakling, unfit to play games at school, and who found his true level in a quiet, sedentary, unambitious walk of life attempts to undertake larger responsibilities, he becomes incapacitated by the giddiness, fatigue, palpitation, præcordial pain, and other symptoms characterising this disorder. We all recognise that this type of person will never become robust. Those in whom the disorder has arisen as a sequel to shell concussion, or in civil life to some other form of trauma, may be expected to improve slowly if under judicious treatment.

After excluding these cases, and those in whom we find visceroptosis, obesity, arterio-sclerosis, early pulmonary tuberculosis, hyperthyroidism, and so forth, we find that in over 40 per cent. of all patients who are said to suffer from D.A.H. there is evidence of some recent infection, and in an additional 10 per cent. there is anæmia, presumably of toxic origin. In all these cases—50 per cent. of the total—the prognosis is, in my opinion, good. The disturbance may be essentially one of the endocrine glands or of the autonomic nervous system, but it is not the heart that is primarily at fault. If we give a guarded prognosis, keep the patient confined to bed, permit the attention of devoted relations, administer digitalis (which is of no value to the patient), and exercise an anxious watchful supervision lest the patient overtax the heart, we confirm the patient in the belief that he is suffering from serious heart disease, and the condition progresses from bad to worse.

A good prognosis is the first essential in restoring the patient's confidence. He must be told he is not suffering from heart disease, that the heart is healthy, and that he will make a complete recovery. He should not be allowed to lie in bed; the less he is waited on and the more he does for himself the better, for the more he accomplishes the greater the degree of self-confidence he regains. During the first few days massage and passive exercises are of value. When he first begins to walk about his tolerance of exercise is naturally poor, but he should be encouraged to undertake an increasing amount of physical exercise daily. Within a few days he should be performing active physical exercises under skilled supervision; he is then encouraged to take active exercise out of doors. Drugs are seldom indicated; digitalis is wholly useless.

This method of treatment seldom fails, and is usually speedily and eminently successful in restoring the patient to health. It was so in the army. Of nearly 2000 men under my supervision, 69 per cent. became fit for full duty in the front line; and in 1918, when our organisation for physical testing and training had reached its maximum efficiency, no less than 86·9 per cent. of Class A men, admitted to hospital for D.A.H., became fit to rejoin their units. Relapses very seldom occurred.

In civil life the prospects of full recovery are not so uniformly good. The patient does not lead such a healthy life as does a soldier in a command depôt; he is now less amenable to control. Physical training, needing skilled supervision, is costly and not so efficient as it was in the army; there are devoted relatives whose influence is the reverse of helpful; and in certain grades of the community there is the sure expectation that incapacity for work will be compensated by grants from public funds. Nevertheless, brilliant results may be obtained, even under the adverse conditions of civil life, and a man or woman who has been practically bedridden for months may, within a few weeks, be leading an active and useful life. The cases in whom the dominant manifestations are those of neurasthenia are the most intractable and the most prone to relapse.

Extrasystoles.

Passing to the most common of all forms of cardiac irregularity—namely, extrasystoles. The prognosis should never be based on the extrasystoles alone, but rather on the underlying cause. If they are due to sympathetic stimulation of the heart under the influence of the emotions, or to obvious toxæmia from tobacco, and if the patients are otherwise healthy a favourable prognosis may unhesitatingly be given. Extrasystoles are likewise not of serious significance if they arise, even without definite cause, in young adults in whom the heart is healthy and in whom there are no signs of cardiac failure. That the immediate prognosis in these cases is good is demonstrated by the fact that of 34 soldiers sent to the base solely on account of extrasystoles 22 were proved to be fit for category A after a short stay in hospital and in a training centre. In civil life the conditions are equally favourable for recovery. I cannot recall a single instance of extrasystoles, arising in a young man or woman whose heart was otherwise normal, being the precursors of more grave heart affections. In illustration I refer to one patient who, at the age of 48, was suffering from syphilis of the lung, the arteries were healthy, and the heart, save for extrasystoles, was normal. Seven years later he was in rude health. In another, aged 41, extrasystoles were observed during a mild rheumatic attack. He made a complete recovery and enjoyed good health for nine years, when the strain of carrying on his business during the war led to insomnia and other nervous symptoms, and in the course of examination a slight mitral leak was detected.

In patients over 40 years of age, however, extrasystoles arising without obvious cause should be regarded with some suspicion, for they probably indicate commencing sclerosis of the coronary arteries. The extrasystoles are the first danger signals, and the man's expectation of life is not first class, although it may be several years before any further manifestations of arterio-sclerosis can be elicited. In these cases the determination of the blood pressure is of particular value, for we know that arterio-sclerosis is often the direct sequel to high blood pressure. In cases with any symptoms of cardiac failure a most careful examination of the pulse should be made in order to ascertain whether there is any alternation of the pulse after the extrasystoles. Even transient alternation, with alternate weak and strong beats, is always of evil omen, and I am in accord with those who find that these patients seldom survive for more than one, or at most two, years. In the aged extrasystoles are not only frequent, but are usually attended with remarkably few symptoms and with a relatively good prognosis.

Extrasystoles arising in the ventricles are, on the whole, attended with a better prognosis than those arising in the supra-ventricular portions of the heart—namely, auricular and nodal extrasystoles. Whereas a man with ventricular extrasystoles and thickened arteries may continue at his work for some years before becoming seriously incapacitated, the heart of an individual with auricular or nodal extrasystoles has been failing before they were observed.

The isolated, or single, extrasystole is of lesser significance than multiple extrasystoles occurring in series and causing momentary attacks of palpitation or of tremor cordis, because multiple extrasystoles are not infrequently the forerunners of paroxysmal nodal tachycardia, of flutter, or of fibrillation.

Auricular Fibrillation.

Lastly, as to the prognosis of auricular fibrillation. When this begins we know that the last act has begun. How long will it be before the curtain finally falls? It may be within a few weeks or it may be ten or more years. The prognosis is generally more favourable in those with mitral disease than in those with arteriosclerosis and myocardial degeneration. Apart from this there are four great factors which influence the prognosis: (1) Those without much acceleration of the ventricular rate suffer least and survive longest, whereas a high ventricular rate is unfavourable. (2) The response of the heart to digitalis. Those in whom the ventricular rate is readily controlled by this drug or by strophanthus may for years lead quiet lives with little discomfort. (3) Those in whom the ventricles do not become dilated remain comparatively well, whereas in those who develop dropsy the prognosis is much more grave. The first attack of dropsy is seldom fatal, but it recurs from time to time, and on each occasion recovery becomes more tedious. (4) Finally, we may observe symptoms and signs of chronic nephritis; the cardiac patient has become a cardio-renal one, and we know the fatal issue is within measurable distance.

EFFECTS OF HOT AND COLD APPLICATIONS ON THE SUPERFICIAL AND DEEP TEMPERATURES.

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THAT the local application of heat or cold to the surface of the body is of value in the treatment of a variety of clinical conditions is well known, but no data apparently exist to show the extent to which the application causes actual change in the temperature of the underlying tissues. With the aid of the Research Committee of the Medical Services of the Department of Militia and Defence of Canada we have undertaken to carry out a series of observations to collect such data, and the interesting and definite character of the results has prompted us to offer a brief account of them at the present time.

The Apparatus.

The observations have been conducted on rabbits. Heat or cold was applied over an area of shaved or closely clipped skin by means of an appliance which we have styled the "applicator." For heat two types of these have been used—either an electric pad (9·5 cm.), giving with 0·6 amps., temperatures ranging up to 55° C., or a water applicator, consisting of a glass tube of 20 mm. internal diameter, closed at one end by a thin rubber membrane and having water from a heat-insulated reservoir circulating through it at a definite and constant temperature.

The exact temperatures at the point of contact of the applicators with the skin was recorded from time to time during the observations by means of thermo-electric couples placed either in the cloth covering the electric pad or just inside the rubber membrane of the water applicator. To measure the temperatures of the tissues thermo-electric couples mounted within hypodermic needles were used. The couples were made of copper constantin wires, the ends being twisted together, and the junction coated with shellac. The sharp ends of the hypodermic needles were sealed with a little solder, so that the couple, occupying about 4 mm. of the needle, lay as near as possible to its point.

The position of the thermo junction in the tissues was determined by measurement of the depth to which the needle was inserted into the tissues, and the angle which it made with the surface. The couples were connected with an Ayrton-Mather dead beat galvanometer, and with a Leeds and Nothrup precision potentiometer, giving direct readings down to 1μV. Since the above couples have a thermo-electric force of 40μV. per degree C., this means that differences of $\frac{1}{40}$° C. could be measured with precision. The couples were calibrated by placing the hot junctions (in the hypodermic needles) in a bath of warm water with a stirrer and noting the temperature differences corresponding to given E.M.F.'s. The cold junction was placed close to the bulb of a sensitive certified mercury thermometer in water near room temperature in a large Dewar flask. From the results a calibration curve was constructed. The above method has been adopted after trial of several others, and we are greatly indebted to Professor E. F. Burton, of the Physics Department of Toronto University, for his valuable assistance in this part of the work.

Observations of Normal Temperatures.

A series of preliminary observations of the normal temperatures in the muscles and rectum were made, both before and during the application of local heat at a point of the body far removed from the the thermo couple; Table I. gives the results.

TABLE I.

Temp. in muscle.		Temp. in rectum.		Duration of observation.	
Initial.	Heating opposite leg.	Initial.	Heating leg.	Before heating.	During heating.
°C.	°C.	°C.	°C.	Min.	Min.
38·0–37·3	37·3–37·2	—	—	33	24
38·2–38·2	38·2–38·8	—	—	15	70
37·2–37·2	37·2–37·9	—	—	10	75
39·7–37·5	37·5–37·5	—	—	85	15
38·2–38·0 1ft. 37·6–37·5 rt.	—	—	—	65	—
38·0–37·0	37·0–37·0	38·0–37·4	37·4–37·3	62	10
39·7–39·8	39·7–39·2	—	—	28	50
37·2–36·0	—	38·0–38·0	—	57	—
37·7–36·9	36·9–37·0	37·6–36·7	36·7–36·4	50	32
38·4–38·4	38·4–38·2	38·7–39·0	39·0–38·8	20	25

Note.—These figures being taken from curves the second decimal is omitted.

The initial temperatures, it will be seen, varied in the rectum between 36·7° and 39° C. with an average of 37·92° C., and those in muscles between 36·9° and 39·7°, with an average of 37·90° C. Usually, the rectal temperature was a fraction of a degree above that in muscle, and the average deep temperature was somewhat above the normal usually given for rabbits. This difference is of no significance in the present investigation, the important point being that the deep temperature, as measured in the rectum or in muscle, did not change much over considerable periods of time and was not affected by the local application of heat to the surface of the body at some distance from the thermo couple, even when the temperature in the applicator was 15° C. above that of the skin.

The normal temperature under the skin varied according to whether the fur was clipped closely with the scissors or was completely shaved off. Without removal of the fur, in 13 observations on different days the skin temperatures varied between 36·9° and 39° C., the average being 37·94° C., or practically the

same as in the muscles; after removal of the fur by shaving the readings in nine different observations varied more widely (from 31·38° to 35·85° C.), with an average of 34·2° C. These results are important, since they illustrate the heat-conserving influence of the fur, the variability in the readings after shaving being, no doubt, dependent upon the cooling influence of the air. Observations on this relationship, in which the kata-thermometer of Leonard Hill is used, will be reported in a later communication. Meanwhile, it is interesting to note that the above observations were made during the winter months, when, although the room was artificially heated, its mean temperature was decidedly lower than during June. In five other observations made during this month the (shaved) skin temperatures, with one exception, were all over 34·4° C.

In all of the experiments in which the skin was shaved a second thermo couple was placed in the muscles immediately under, and at varying depths from, the one in the skin. The differences observed between the skin and muscle temperatures in degrees centigrade in 14 experiments were as follows: 3·27, 3·4, 1·2, 0·87, 2·16, 4·97, 2·93, 2·10, 0·12, 2·3, 1·9, 1·0, 3·2, and 2·4. The variability is mainly due to differences in skin temperature, that of the muscles being very much more constant. The figures indicate the extent to which the superficial blood loses heat by radiation and convection from the uncovered skin. General anæsthesia was not found to have any appreciable effect on these values.

Influence of Local Heat.

Coming now to the influence of local heat, the following types of observation have so far been made.

1. Temperature of skin of thigh on application of electric pad. The first observations were made with the fur unshaved, the initial temperature, as already pointed out, being, therefore, not appreciably different in the skin and in the muscles. Table II. gives, in condensed form, the most significant results.

TABLE II.

Temp. of pad.	Difference between temp. of pad and skin.	Temp. reached in skin.	Extent of rise in temp.	Temp. of pad.	Difference between temp. of pad and skin.	Temp. reached in skin.	Extent of rise in temp.
°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
43·5	6·3	42·1	4·9	50·2	11·9	43·2	4·9
44·8	6·9	42·7	4·8	50·65	13·55	44·6	7·5
46·65	8·65	42·45	4·45	50·8	15·2	42·8	5·2
47·5	10·6	42·1	5·2	55·05	17·85	45·15	7·95
48·55	9·35	43·2	4·5				

Up to a temperature difference of 12° C. the skin temperature, it will be seen, rose about 5° C., a moderately warm applicator having almost as great an effect as one that was considerably warmer. In later observations, in which the skin was thoroughly shaved, a similar relationship between the rise of skin temperature and the temperature of the applicator was not so evident. This is probably to be accounted for by the fact that in these cases the skin temperatures, as already pointed out, were considerably lower and much more variable than in the cases where the fur still remained on the skin.

The extent of lateral spread of the temperature change (on shaved skin) was found to be considerable. Thus, in four observations with the (water) applicator well insulated so that no heat could radiate on to the skin beyond its edge, no change was observed at 35 mm. distance, but was quite definite at 19, 16, and 10 mm., the applicators being at temperatures from 11° to 15° C. above that of the skin.

2. Temperature of skin and underlying muscle of thigh on application of hot-water applicator, to overlying skin.

Although the observations (see Table III. and Fig. 1) are insufficient to indicate the maximal depth to which locally applied heat may penetrate the tissues they show at least that this is considerable (over 20 mm.). The rise in the muscles is more gradual than under the skin. The heat of a poultice or of fomentations must therefore penetrate for a considerable distance, even into relatively vascular tissues.

TABLE III.

Temp. of pad.	Difference between temp. of applicator and muscles.	Temp. reached in muscles.	Rise in temp.	Depth of thermo couple.
°C.	°C.	°C.	°C.	mm.
43·41	6·91	38·29	1·79	20
45·83	7·31	38·42	2·07	12
46·70	9·00	39·70	2·00	18
46·14	9·20	39·21	2·27	17
46·87	11·79	39·15	4·07	17
49·48	14·55	37·95	3·02	9
48·61	10·39	40·10	1·88	16
46·50	10·53	39·8	3·83	16
48·42	11·32	38·64	1·54	17

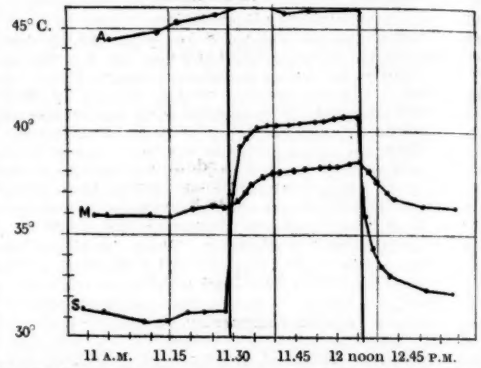

FIG. 1.—Curves showing temperatures (in ° C.) on ordinates at the times indicated on the abscissa, immediately under the (shaved) skin over the gluteal region and in the muscles at a depth of 12 mm. Both the thermo couples, by which the temperatures were recorded, were under the centre of the hot-water applicator. A., applicator. M., muscle. S., skin. The two vertical lines mark the time during which the heat was applied.

3. Temperature in various regions of the abdomen on application of heat to the abdominal wall. Needles were introduced in various regions of the abdomen and the electric pad applied unheated to the surface, and the current then gradually turned on. Even though the temperature of the pad, covering approximately one-half of the abdomen, was raised slowly to 55° C., there was no change in rectal temperature. On

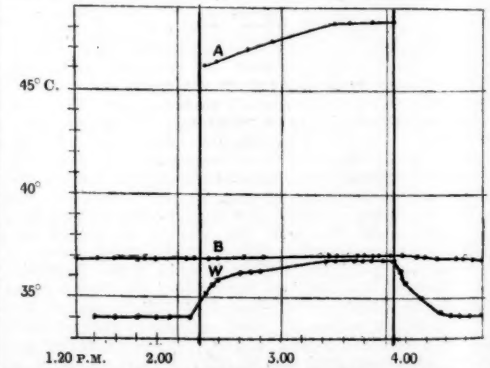

FIG. 2.—Curves showing temperatures (in ° C.) on ordinates at the times indicated on the abscissa, just within the abdominal wall and in the small intestine 30 cm. from the jejunal junction at a depth of 54 mm. from the hot-water applicator which was applied to the surface of the abdomen. A., applicator. B., intestine. W., just inside abdominal wall. The two thick vertical lines mark the time during which the heat was applied.

the other hand, the heat spread rapidly through the abdominal wall itself; thus, when the couple was placed just inside the wall and under the applicator a rise of 4° C. was observed with the temperature difference of 13·13° C. When the couple was 17 mm. distant from the edge of the applicator the rise was 0·32° C., and when it was 35 mm. distant no change in temperature occurred.

Between the abdominal wall and the rectum the temperature spread was found to be considerable, the observation being made on (anæsthetised) animals which were killed afterwards, and the exact position of the couple ascertained by dissection. It was found, with a temperature difference of 12° to 16° C. in the applicator (covering the upper left quadrant of the abdomen), that the temperature within the cæcum rose through from 3° to 5·16° C.; just behind the cæcum it rose 1·12° C. and in the wall of the ascending colon 4·04° C. The curves of one of the experiments of this series are given in Fig. 2, one needle (B) being just within the abdominal wall and the other (A) in the small bowel 30 cm. from the jejunal junction and 7·5 cm. from the point of application of the heat, at a depth of 5·4 cm. below the surface. The rise in this needle, though small (0·3° C.) is yet perfectly definite, and that it was an effect of the applied heat is indicated by the immediate fall following the removal of the applicator. The results in general show that when heat which is about 15° C. above that of the body is applied over approximately one-fourth of the surface of the abdomen a change in temperature may occur which may penetrate the abdominal viscera for a distance of about 75 mm., although it can only spread laterally for somewhat less than 20 mm.

Finally, we have completed a sufficient number of observations on the effects of cold to be in a position to state that the results are equally as definite as those for heat, the temperature change being, of course, in the opposite direction.

THE COMPLEMENT-FIXATION TEST IN PULMONARY TUBERCULOSIS:

ITS USE AS A MEANS OF DIAGNOSIS.

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(A Preliminary Report to the Medical Research Council.)

SINCE Bordet and Gengou [1] in 1903 demonstrated the presence of antibodies capable of uniting with tubercle bacilli and fixing complement in the sera of tuberculous animals, numerous attempts have been made to make use of this fact to obtain a reliable biological test for tuberculosis in human beings. A study of the literature of the subject indicates that although there has been considerable diversity in the results obtained by different observers, yet on the whole there has been a steady improvement in the technique employed and in the reliability of the results obtained.

This diversity in the results appears to be largely attributable to differences in the technique employed by various observers and more especially in the character of the antigen employed.

Previous Observations.

Wassermann and Bruck [2] in 1906 treated tuberculous patients with tuberculin and showed that the blood serum of such patients contained antibodies capable of fixing complement in the presence of tuberculin. Citron [3] subsequently showed that the blood serum of tuberculous patients who had not been treated with tuberculin exhibited the same property of fixing complement in the presence of tuberculin. Various other observers, such as Wolff and Muhsam,[4] Cohn,[5] Koch,[6] and others, elaborated the technique of Wassermann and Bruck, and by using tuberculin as an antigen obtained positive results in definitely tuberculous patients in from 33 to 78 per cent. of cases. Besredka [7] in 1914 found that by using a special tuberculin he obtained a large percentage of positive results in definitely tuberculous patients. Kuss,[8] Inman,[9] and others proved, however, that this antigen was not specific, in that a considerable number of non-tuberculous syphilitic subjects gave a positive reaction with it.

The most recent workers in this field have used an emulsion of tubercle bacilli as antigen; these included Frugoni,[10] Caulfield,[11] Dudgeon,[12] and, most recently of all, McIntosh and Fildes.[13] Here, again, the results have been variable. The last-named observers investigated a series of cases of tuberculosis of various organs. As the present investigation deals exclusively with pulmonary tuberculosis their figures will be considered in relation to this form of tuberculosis only. They obtained out of 43 cases of definite phthisis, as evidenced by the presence of tubercle bacilli in the sputum, 33 positive results, or 76 per cent. In 18 cases of "clinically certain" tuberculosis of the lung or pleura, not verified bacteriologically, they obtained ten positive results, or 55·5 per cent. As the diagnosis of a "clinically certain" case of phthisis is so largely dependent upon the individual clinician's criterion of what is "clinically certain," no definite conclusion can be drawn from these latter figures without some knowledge of what such criteria were.

Other workers using an emulsion of tubercle bacilli as antigen have obtained variable results, with the percentage of positive results in definite cases of phthisis, in some cases higher, and in some lower.

Object of the Investigation.

This investigation deals only with the application of the test to cases of pulmonary tuberculosis, and it was undertaken with a view to seeing if it were possible by modifications of the test to obtain results of sufficient reliability to warrant its being regarded as a specific reaction for the diagnosis of *active* tuberculosis.

The Difficulty Encountered by Previous Workers: Methods which have been Attempted to Overcome It.

In order that a reaction may be regarded as a specific test for the presence of active pulmonary tuberculosis it is necessary that a positive result should be obtained in 100 per cent. of cases definitely suffering from phthisis, or at all events in at least 98 per cent. of cases, for 2 per cent. is surely within the permissible limits of error, and at the same time no positive results should be obtained in cases definitely not suffering from tuberculosis.

The bulk of the workers on the subject are, I think, agreed that a positive result is only given in the presence of a tuberculous lesion. The difficulty hitherto encountered has been that of obtaining a sufficiently high percentage of positive results in cases known to be suffering from tuberculosis to warrant the conclusion that those cases that gave a negative result were not suffering from this disease.

The difficulty of obtaining positive results in definitely tuberculous cases has caused a doubt to be entertained as to whether the antibodies are present sufficiently constantly to make them of value for diagnostic purposes. It is certainly true that the complement fixing powers of the blood of tuberculous subjects is often infinitely less than that of syphilitic subjects, so that unless we can increase the amount of anti-substances a much more sensitive test is necessary to demonstrate their presence.

At the outset an attempt was made to increase the antibodies by administering minute doses of tuberculin (B.E.) to the patients in the hope, upon purely theoretical grounds, that tuberculous subjects would turn out more antibodies into the blood than non-tuberculous ones. As this procedure did not appear to have any effect upon the results it was abandoned. It was found, however, that the maximum amount of antibodies were present in a serum which had been allowed to remain in contact with the clot, after withdrawal of the blood from the patient for a period of 24 hours. This is in accordance with observations of Nesfield,[14] and bears out the suggestion of Metchnikoff, Danys, and Kauthack, that antibodies are formed by the leucocytes. In some of the early cases in the investigation the serum was pipetted off as soon as the blood had clotted, with a result that a negative reaction was obtained in several cases definitely suffering from phthisis, but on repeating the test, observing the precaution of keeping the serum in contact with the clot for 24 hours, a positive result was obtained.

Since it did not appear evident how the antibodies could be increased the course adopted was to make the test progressively more and more sensitive and so endeavour to detect the smallest quantities present.

The Danger of Making the Test Too Sensitive.

The danger to be encountered in making the test too sensitive is of obtaining non-specific summation effects. The blood serum of non-tuberculous individuals is capable, though in my experience to a very small extent, of causing a certain degree of fixation of complement in the presence of tubercle bacilli and so, if the test is made very sensitive, of giving non-specific effects. If all non-tuberculous sera possessed this property in an equal degree it would be a simple matter to estimate once and for all the amount of complement so fixed and add it to the minimum hæmolytic dose of complement used in the experiment. But this is not so. Some sera do not possess it at all and others to a varying extent.

The problem was to determine the maximum amount of fixation that could be due to non-specific effects and then to employ a technique whereby any fixation over and above this could be clearly demonstrated.

The Maximum Amount of Non-specific Fixation.

The results of my experiments have very definitely convinced me that this property of the blood from non-tuberculous subjects is never sufficient to fix as much as half the minimum hæmolytic dose of complement as determined in the antigen titration. Usually it is much less than this, and often absent altogether.

Method Employed of Making the Test More Sensitive.

At the outset of the investigation 2½ times the minimum hæmolytic dose (M.H.D.) of complement as determined in the antigen control was used in the experiment. When using this amount of complement 66 per cent. only of cases known to be suffering from pulmonary tuberculosis gave a positive result.

It seemed possible that although antibodies were present in the blood they were there in insufficient quantities to fix 2½ times the M.H.D., and so be demonstratedwhen using this amount of complement. So that a second series of tubes were put up, using 1½ the M.H.D. in addition to those containing 2½ times the M.H.D. By this procedure the positive results in cases definitely suffering from pulmonary tuberculosis was increased to about 90 per cent. A third series of tubes was then put up in each case, using once the M.H.D. It has already been mentioned that some sera from non-tuberculous individuals are capable of causing non-specific fixation in the presence of tubercle bacilli, and that these experiments tend to show that if we take half the M.H.D. as the maximum amount of complement that such non-specific sera can fix we are well over the possible limit that this property can reach. If, then, exactly the minimum hæmolytic dose of complement were used in the experiment anything more than 50 per cent. inhibition of hæmolysis would indicate some specific fixation and a positive result. But it is impossible in one tube only to determine the degree of inhibition of hæmolysis. All we can accurately determine is complete inhibition or complete hæmolysis. But if in addition to the tube containing exactly the M.H.D. of complement the other tube containing one and a half times the M.H.D. be employed in each experiment, then in the latter tube fixation can go on to the extent of 50 per cent. of the M.H.D. before there is any evidence of inhibition of hæmolysis in that tube, so that the smallest deposit of undissolved corpuscles would indicate some specific fixation and a positive result.

It might be argued that if any particular serum under examination had no power of non-specific fixation, and at the same time the specific antibodies present were less than sufficient to fix half the M.H.D., a negative result would be given in a definite case of phthisis. But the results of the experiments tend to the conclusion that in all cases of active phthisis specific antibodies are present in the blood in sufficient quantity to cause of themselves fixation of at least half the M.H.D. of complement, and as a rule of very much more than this.

The Reagents used in the Test.

1. *The antigen.*—The antigen used is an emulsion of live tubercle bacilli. A growth is obtained upon a glycerine potato medium prepared as follows:—

Slices of potato are cut as for the preparation of an ordinary potato medium, and put to soak for 1½ hours in a 6 per cent. solution of glycerine in water to which sufficient of a 1 per cent. solution of gentian violet has been added, so that the resultant solution shall contain gentian violet in the proportion of 1 in 6000. The potato is then removed from the solution and placed in potato tubes, the bulbs of which are filled with 6 per cent. glycerine. The tubes are then autoclaved at 115° C. for 15 to 20 minutes.

A culture of tubercle bacilli can be obtained upon this medium directly from a tuberculous sputum after treatment with antiformin in the usual way and subcultures taken from this. After the inoculated tubes have remained in the incubator for 24 hours to ensure of no contamination having taken place, the cotton wool closing the mouths is impregnated with paraffin.

Upon this medium more than sufficient growth is obtained in one tube in from 10–14 days to make up 100 c.cm. of antigen.

The advantages of this medium are that a rapid growth of tubercle bacillus is obtained, that the yellow colour of the growth is clearly differentiated from the brilliant violet colour of the medium, and that the slice of potato can easily be removed from the tube, is easily handled, and the growth can readily be scraped off the firm medium without the removal of any of the latter.

To *make up* the antigen for use, a sufficient quantity to make an emulsion of 1 in 2000 is then scraped off into a Hayden's mortar. This is thoroughly emulsified dry, three drops of fresh normal saline are then added, and after further emulsification three more drops, and finally 14 drops of saline added. The resultant emulsion is then sucked up into a pipette and placed in a flask. Sufficient normal saline to make the required dilution of 1 in 2000 is then added gradually, the mixture being thoroughly agitated after each addition. The antigen is then ready for use. This antigen *must* be made up freshly on the day of each experiment. The keeping powers of such an antigen seem to be very doubtful, and if a fresh emulsion is not used very discordant results are obtained.

The amount of antigen employed in the experiment has been kept constant at 0·5 c.cm.

2. *The patient's serum.*—5 c.cm. of blood are withdrawn from a vein in the arm and placed in a sterile test-tube. The test-tube is then allowed to stand at the room temperature for 24 hours, after which the serum is pipetted off the clot. The serum is then inactivated for one hour in a water-bath at 55° C.

Quantity of serum used in the experiment: Quantities of serum varying from one to eight drops were tried and the most constant and satisfactory results were obtained by employing four drops, so that this amount has been adhered to in all experiments.

3. *Hæmolytic amboceptor.*—This has in all cases been an antisheep serum.

4. *Blood.*—The blood in all cases has been a 5 per cent. suspension of washed sheep's blood.

5. *Complement.*—The complement is obtained from a single guinea-pig on each occasion.

Technique of the Test.

The technique employed is identical in principle with that laid down by McIntosh and Fildes for the performance of the Wassermann reaction. But at the risk of repeating much that is common knowledge, the stages of the test will be described in some detail in order to bring out clearly certain not unimportant points.

1. *Titration of the Complement.*

A dilution of 1 in 24 of guinea-pigs' serum is made. Five Wassermann tubes are taken and the diluted serum and normal saline added in the following amounts:—

	Tubes (1)	(2)	(3)	(4)	(5)
Complement (c.cm.) ...	0·05	0·1	0·15	0·2	0·25
NaCl (c.cm.)	0·95	0·9	0·85	0·8	0·75

These are then placed in a water bath at 37° C. and 0·5 c.cm. of sensitised sheeps' corpuscles added. At the end of half an hour the tubes are removed from the water-bath and the readings taken. In a majority of instances complete hæmolysis will have taken place in the third tube and either no hæmolysis or incomplete hæmolysis in the first and second tubes.

A complement of sufficiently high potency that 0.15 c.cm. of a 1 in 24 dilution of serum will cause complete hæmolysis or one of greater potency than this is satisfactory for the performance of the test. But a less potent complement than this—one, for instance, with which complete hæmolysis occurs only in the fourth or fifth tubes—does not give satisfactory results. It is especially in the last two tubes in the test, in which exactly the minimum hæmolytic dose of complement is used, that unreliable results are given if a complement of low potency is used. If, then, in titrating the complement there is no hæmolysis or only incomplete hæmolysis in the third tube the complement should be discarded and a fresh guinea-pig bled.

The necessity of using a serum whose complementing power is potent has very little practical disadvantage, as most guinea-pigs will supply a serum sufficiently potent in

its complementing power that 0·15 c.cm of a dilution of 1 in 24 will cause complete hæmolysis of 0·5 c.cm. of sensitised corpuscles, especially if particular care be taken not to employ a pregnant animal.

2. *The Titration of Complement in Presence of Antigen.*

The next stage consists in the titration of the complement in the presence of a fixed amount of antigen to determine the minimum amount of complement which will cause complete hæmolysis in the presence of antigen. The antigen as prepared in the manner described above has a definitely anti-complementary action; hence more complement is required to hæmolyse the corpuscles in the presence of the antigen than in its absence. The extent of this anti-complementary action of the antigen appears to be in direct proportion to its strength.

Five tubes are again taken and complement, normal saline, and antigen added in the following proportions:—

	Tubes (1)	(2)	(3)	(4)	(5)
Complement (c.cm.) ...	0·05	0·1	0·15	0·2	0·25
NaCl (c.cm.)	0·45	0·4	0·35	0·3	0·25
Antigen (drops)	10	10	10	10	10

The tubes are placed in a water-bath at 37° C. for one hour, and then the sensitised corpuscles added. They are allowed to remain in the water-bath for half an hour. In my experience, with an antigen of the strength above described, there will be incomplete or no hæmolysis in the last tube in which there was complete hæmolysis in the titration in the absence of antigen, but there will be complete hæmolysis in the tube next to it to the right.

That is to say, an antigen of this strength is anticomplementary to the extent of 0·05 c.cm. of complement. This titration should, however, be carried out in each experiment. The same strain of tubercle bacilli has been used in all the experiments. Whether or no different strains would be anti-complementary to a varying degree I do not know. In this way the minimum hæmolytic dose is arrived at.

In using the term minimum hæmolytic dose one is only speaking relatively when working with differences of 0·05 c.cm. of complement. That is to say, if there were complete hæmolysis in the fourth tube and incomplete hæmolysis in the third the actual minimum hæmolytic dose lies somewhere between 0·2 and 0·15 c.cm. of complement. This suggested that it might be advisable to get nearer to the true M.H.D. by working with finer differences of complement. So that a series of experiments were done, using differences of 0·025 c.cm. of complement between each tube. Experience proved, however, that, although by this means one could get nearer to the true M.H.D.—0·175 c.cm., say, instead of 0·2 c.cm.—differences of 0·05 c.cm. were sufficiently fine for practical purposes.

3. *The Test.*

For each serum to be examined six Wassermann tubes are taken. The antigen, patient's serum, complement, and saline are added as follows:—

	Tubes (1)	(2)	(3)	(4)	(5)	(6)
Patient's serum (drops)	4	4	4	4	4	4
Normal saline (drops)	10	—	10	—	10	—
Antigen (drops)	—	10	—	10	—	10
Complement (c.cm.)	0·5*	0·5*	0·5†	0·5†	0·5‡	0·5‡

* Containing 2½ M.H.D. † Containing 1½ M.H.D.
‡ Containing 1 M.H.D.

Tubes 1, 3, and 5 are, of course, the controls. All tubes are well shaken and placed at the room temperature for three-quarters of an hour. They are then transferred to a water-bath at 37° C. for three-quarters of an hour. At the end of this time the sensitised sheep's blood is added. The tubes are then left in the water-bath for a further half-hour and then removed and the readings taken.

Reading the Results.

Bearing in mind what has already been said with regard to the maximum amount allowed for non-specific fixation, the reading of the results will be quite simple.

Occasionally, for some reason I am unable to explain, it may require a little longer than half an hour for complete hæmolysis to take place in the controls containing the highest dilution of complement. But an extra five minutes or so in the water-bath will effect complete hæmolysis, and this does not in any way vitiate against the reliability of the results, for as much as an hour or an hour and a half will not bring about hæmolysis in any tube in which there is true specific fixation. In a very strongly positive result there will be no hæmolysis at all in tubes 2, 4, and 6.

In a less strongly positive result complete hæmolysis may have taken place in tube 2, but little or none in tube 4, and none in tube 6.

In the least strongly positive of all there will be complete hæmolysis in tube 2, and there may be very considerable hæmolysis in tube 4, but, and this is the most important point of all, the hæmolysis in this tube will not be complete, there will always be some turbidity of the fluid, indicating that more than half the M.H.D. of complement has been fixed; in the sixth tube there is usually no hæmolysis, and always less than 50 per cent.

In a negative result there will usually be complete hæmolysis in all the tubes, but in a certain number of cases the hæmolysis in tube 6 will not be complete, but the hæmolysis in tube 4 is always complete. The tubes are then placed in an ice chest over night and the readings verified in the morning.

In a positive result there will always be some undissolved corpuscles collected at the bottom of tube 4.

In the tables below the following plan of recording the results has been adopted.

If there appeared to be complete or over 50 per cent. of inhibition of hæmolysis in the second tube, with complete inhibition in tubes 4 and 6, the result is recorded as +++. If there appeared to be no inhibition of hæmolysis or under 50 per cent. in tube 2, but over 50 per cent. in tube 4, the result is recorded as −++. A result recorded as −−+ signifies that there was less than 50 per cent., but always some inhibition of hæmolysis in tube 4.

Up to the present it has not been possible to discover any obvious correlation between the strength of the reaction given and either the extent of the disease, its duration, or its probable clinical course. Some early cases and some advanced cases have given a strong reaction, other early cases and other advanced cases have both given a positive reaction in the highest dilution only, and cases apparently doing well have given both strong and weak reactions in different instances, as have cases apparently progressing rapidly.

It follows from this that the first two tubes in which 2½ M.H.D. is used could be omitted from the experiment. But they have been and are still being retained partly for the sake of comparison of the later with the earlier results and partly in the hope that careful study of the subsequent history of each case may reveal some prognostic or other significance in the strength of the reaction that does not at first sight seem evident.

Results.

The investigation extended over four stages. Stage 1 was purely experimental, and no results were recorded. In stage 2, 2½ M.H.D. only of complement was used. In this stage 66 per cent. of cases having tubercle bacilli in the sputum gave a positive result. In stage 3, 2½ M.H.D. and 1½ M.H.D. were used, and 90 per cent. of cases having tubercle bacilli in the sputum gave a positive result. A detailed consideration of these results would be of no value, as the percentage of positive results in cases known to be suffering from pulmonary tuberculosis was not sufficiently high to warrant any conclusion being drawn from the negative results.

In stage 4, 2½, 1½, and 1 M.H.D. were employed in each case, and the results thereby obtained will now be considered in detail.

Classification of Results.

For the purpose of classification the results have been placed in four groups.

Group 1, in which tubercle bacilli had been found in the sputum at the time of performance of the test.

Group 2, in which tubercle bacilli were found in the sputum subsequent to the performance of the test.

Group 3, other cases giving a positive result.

Group 4, cases giving a negative result.

Stage 4.—In which three dilutions of complement were used—namely, 2½ M.H.D., 1½ M.H.D., and 1 M.H.D. as determined by the antigen control.

Group 1.—In which T.B. were present in the sputum at time of test (Table I.).

Group 2.—In which T.B. have been found in sputum subsequent to performance of complement-fixation test (Table II.).

Group 3.—Other cases in which T.B. had not been found in the sputum up to the time of writing this report in which a positive reaction was obtained in one or more dilutions of complement (Table III.).

It must be appreciated that in a considerable number of the cases in this group the test has been performed within the last month or so, and there can be no doubt that in many of them T.B. will be found in the sputum at a subsequent date. All the cases in Table II. were at one stage in this table, and the former table is rapidly increasing at the expense of the latter. The sputa of

the cases in this group are, of course, being examined when present at regular intervals for the presence of T.B. In some cases the disease may have become arrested, as is probable in No. 38.

TABLE I.

No.	M.H.D. 2½	1½	1	No.	M.H.D. 2½	1½	1	No.	M.H.D. 2½	1½	1	No.	M.H.D. 2½	1½	1
1*	–	+	+	14	+	+	+	27	0	+	+	39	–	+	+
2*	–	–	+	15	–	+	+	28	+	+	+	40	–	+	+
3*	–	–	+	16	+	+	+	29	–	–	+	41	+	+	+
4*	–	+	+	17	+	+	+	30	–	–	+	42	+	+	+
5	0	+	+	18	–	–	+	31	+	+	+	43	+	+	+
6*	–	–	+	19	–	+	+	32	+	+	+	44	+	+	+
7*	–	+	+	20	+	+	+	33	+	+	+	45	+	+	+
8	+	+	+	21	+	+	+	34	+	+	+	46	+	+	+
9	–	+	+	22	+	+	+	35	+	+	+	47	+	+	+
10	–	–	+	23	+	+	+	36	+	+	+	48	+	+	+
11	–	+	+	24	+	+	+	37	–	+	+	49	+	+	+
12	0	+	+	25	+	+	+	38	+	+	+	50	–	+	+
13†	–	–	–	26	–	+	+								

* These cases were done previously in lower dilutions of complement and with negative results.

0 signifies that there was insufficient blood sent for all dilutions. All cases, therefore, in which T.B. were present in the sputum at the time of examination of the blood gave a positive result save one (No. 13).

† Case 13.—This was a case which was diagnosed a bronchiectasis, and which had all the typical symptoms and physical signs of this condition. But on the third routine examination of the sputum T.B. were said to be present. The sputum has been examined frequently since, but the presence of T.B. has not been confirmed. So that it is reasonable to assume an error on the third routine examination.

TABLE II.

No.	M.H.D. 2½	1½	1	No.	M.H.D. 2½	1½	1	No.	M.H.D. 2½	1½	1	No.	M.H.D. 2½	1½	1
1	+	+	0	7	+	+	+	13	+	+	+	19	–	–	+
2	–	–	+	8	+	+	+	14	+	+	+	20	+	+	+
3	–	+	0	9	+	+	+	15	+	+	+	21	–	+	+
4	+	+	+	10	+	+	+	16	+	+	+				
5	–	–	+	11	+	+	+	17	+	+	+				
6	–	+	+	12	0	+	+	18	–	+	+				

Group 4.—Other cases giving a negative result in all three dilutions. Of these there were 92. Examining these cases in detail their condition is shown in Table IV.

Summary of Results in Stage 4.

Group 1.—If we exclude Case 13, on the grounds that the finding of tubercle bacilli in the sputum was an error, 100 per cent. of the cases having T.B. in the sputum at the time of performance of the test gave a positive result.

Group 2.—100 per cent. of cases in which T.B. were found in the sputum subsequent to the performance of the test had given a positive result.

Group 3.—There appears to be a reasonable conformity between the positive results in this group and the clinical condition of the patients. In a majority of the cases there were present either symptoms or physical signs or both, strongly pointing to the presence of an active tuberculous lesion in the lung or pleura. In many such symptoms and physical signs were sufficiently marked to constitute a clinically certain case of tuberculosis. This group will, of necessity, be continually decreasing at the expense of Group 2. For in many of the cases included in Table III. the test was performed quite recently when the sputum had only been examined once or in some cases before the sputum had been examined at all.

Group 4.—There appears, also, a reasonable conformity between the negative results in this group and the clinical condition of the patients. Many were definitely suffering from diseases other than tuberculosis, some were healthy individuals, and in none were the physical signs and symptoms present which could constitute a clinically certain case of phthisis, save, perhaps, in Case 82, Table IV., in which a positive Wassermann reaction was present and the possibility of syphilis of the lung has to be considered.

Special Points Suggested by the Results.

1. *Persistence of antibodies in the blood after arrest of the disease.*—In Cases 26 and 38 (Table III.) a positive result was obtained. In neither of these cases were T.B. present in the sputum, nor were there any definite physical signs or symptoms pointing to active disease, but in both T.B. had been found in the sputum at a previous date. In Case 38 records were obtainable which proved beyond a shadow of doubt that the patient

TABLE III.

No.	M.H.D. 2½	1½	1	Clinical condition.
1	–	+	+	Physical signs of hydropneumothorax.
2	–	+	+	Phys. signs of fibrosis left apex and excavation left base. Child of 11.
3	–	+	+	Phys. signs of almost complete excavation of left lung. Onset. of pulm. tub. 47 years ago. T.B. in sputum frequently. None on 2 exams. recently.
4	+	+	+	Recent hæmoptysis. Dullness, bronchial breath sounds, crepitation, &c., both apices. Sputum not obtained.
5	–	–	+	Rhonchi all over chest and (?) fine crepitations rt. apex. Week later bronchitis much less and definite pleuritic rub rt. base.
6	+	+	+	Pleural effusion, No sputum.
7	0	+	+	Acute pleurisy 5 months ago. Signs of thickened pleura now.
8	–	+	+	Pleural effusion. No sputum.
9	–	+	+	Child of 11. Diagnosed (?) chronic pulm. tub. Dullness, crepitations, &c., rt. apex. Also (?) cong. syphilis. Wass. reac. neg.
10	+	+	+	At time of test recent hæmoptysis. No a.p.s. A month later definite phys. signs of pulm. tub. and extensive disease confirmed by X rays. No sputum.
11	+	+	+	Impaired note bronchial breath sounds and crepitations at rt. apex. Pyrexia.
12	–	+	+	Impaired note, bronchial breath sounds, crepitations, &c., rt. apex. No sputum.
13	+	+	+	Impaired note, prolonged harsh expiration and definite crepitations detected when out-patient; cleared up after stay in hosp. Still under observation as out-patient.
14	–	–	+	No a.p.s. Night sweats, loss of weight, and irreg. pyrexia.
15	+	+	+	Dullness, bronchial breath sounds, and crepitations, both apices.
16	–	–	+	No a.p.s. Recent hæmoptysis of 4 oz. No sputum.
17	–	+	+	No a.p.s. Loss of weight. Difference of 3° between morning and evening temp. below normal line. Not settling down on prolonged rest in bed.
18	–	+	+	No a.p.s. Loss of weight, considerable hæmoptysis 10 days prev. T. 99·2° F.; P. 124.
19	–	+	+	Dullness, crepitations, &c., rt. apex. Sputum blood-stained. Diag. clin. as pulm. tub.
20	–	+	+	Pneumonia, followed by pleurisy and hæmoptysis, 1916. Hoarse voice, night sweats. Lost 2 st. in two years.
21	–	+	+	Onset following "flu.," 1918. Impaired note, crepitations, &c., rt. apex. Diag. clin. as pulm. tub.
22	–	+	+	No definite a.p.s. Considerable loss of weight.
23	–	–	+	Dullness, crepitations, &c., rt. apex. Pyrexia. Diag. clin. as pulm. tub.
24	+	+	+	Impaired note, crepitations, &c., rt. apex. Hæmoptysis, loss of weight.
25	–	+	+	Impaired note, crepitations, &c., over whole of lt. lung, also over apex of rt. lung. T. 101°; P. 120. Sputum frequently streaked. Diag. clin. as pulm. tub.
26	–	+	+	Said to have had T.B. in sputum 2 years ago. Not present now. No definite a.p.s.
27	+	+	+	Dullness, crepitations, &c., rt. apex. Sputum streaked with blood a week ago. Emaciation.
28	+	+	+	No definite a.p.s. Lost 1½ st. in 2 years.
29	–	+	+	Diag. clin. as C.P.T. in 1905. T.B. not present in sputum. Definite signs then and now. Dullness, distant bronchial breathing and crepitations over upper two-thirds of lt. lung.
30	+	+	+	Phys. signs of bronchitis, stated he had lost 1 st. 2 lb. in 2 years, still losing weight. Has lost 7 lb. in 2 months while under observation as out-patient.
31	–	–	+	No a.p.s. when first seen. Hæmoptysis week prev. Cough for few weeks. Week later numerous crepitations at rt. apex.
32	–	+	+	Impaired note at both apices. Fine crepitations all over lt. lung and at apex of rt.
33	–	–	+	Pleurisy 6 weeks prev. Coloured sputum 6 weeks ago. Loss of weight, night sweats. Fine crepitations rt. apex diag. clin. as pulm. tub.
34	+	+	+	Impaired note and crepitations, &c., rt. apex. Diag. clin. as pulm. tub.
35	+	+	+	Acute pleurisy rt. base.
36	–	+	+	Impaired note crepitations, &c., rt. apex, sputum blood-stained. Diag. clin. as pulm. tub.
37	–	+	+	Pleurisy 1915 and 1918, and at present. Blood in sputum 5 weeks ago. Impaired note both apices and crepitations rt. apex.
38	+	+	+	T.B. present in sputum in 1916 and 1917; absent now. No a.p.s. now. Regarded as case of arrested phthisis.
39	+	+	+	Impaired note, crepitations, &c., rt. apex. Diag. clin. as pulm. tub.

No a.p.s. = No abnormal physical signs in chest.

TABLE IV.—*Cases Giving a Negative Result in Three Dilutions of Complement.*

No.	Clinical condition.
1	Syphilis. Blood sent for Wass., which was + ve.
2	Signs of bronchitis.
	No a.p.s.
4	Melanotic sarcoma of foot.
5	Epithelioma of cervix of uterus.
6	,, ,, ,,
7	Cancer of uterus.
8	? Hydatid of lung at time of test. Operation subsequently showed new growth.
9	Bronchitis and asthma.
10	No a.p.s.
11	,,
12	Signs of bronchitis; said to have had early pulm. tub. 25 years ago. No T.B. found in sputum.
13	No a.p.s. Diag. neurasthenia.
14	No a.p.s.
15	,,
16	Syphilis. Wass. reac. + ve.
17	No a.p.s. Very bad fam. hist. of pulm. tub. Looks ill.
18	No a.p.s.
19	,,
20	,,
21	Bronchitis and emphysema.
22	Diag. pulm. tub. by Pensions Med. Board. Been to sanatorium. No a.p s. Sputum T.B. – ve 9 times.
23	Hæmoptysis some years ago. Attending gen. hosp. several years. No T.B. ever found in sputum. No a.p.s.
24	No a.p.s. Said to have had T.B. in sputum 16/10/19. Absent several times since.
25	Signs of bronchitis. Child of 11. No sputum.
26	Debility. No a.p.s.
27	Impaired note bronchial breath sounds rt. apex. No moist sounds. Had cough during winter, none now.
28	Small hæmoptysis year ago. No a.p.s.
29	No a.p.s.
30	,,
31	No a.p.s. Swinging temp. 97° to 99° F.
32	Signs of bronchitis and emphysema, fine pleural rub over rt. side.
33	Had been to sanatorium 1913. Fine creps. ? pleural angle of rt. scapula. General condition good. No constitutional symp. now. No T.B. in sputum.
34	Cough. Sputum streaked with blood on several occasions. No a.p.s.
35	Impaired note and weak breath sounds rt. base.
36	Impaired note and fine crepitations rt. apex.
37	No a.p.s.
38	Loss of weight. No a.p.s.
39	Small hæmoptysis 6 months ago. No a.p.s.
40	Signs of emphysema.
41	Small hæmoptysis. No a.p.s.
42	Small hæmoptysis 1916. No a.p.s.
43	No a.p.s.
44	Blood sent for Wass., which was neg.
45	No cough, expectoration, or hæmoptysis. Crepitations at rt. base.
46	No a.p.s.
47	Sputum streaked with blood previously. No a.p.s. No sputum now.
48	Said to have had pulm. tub. 16 years ago. No a.p.s. now.
49	Wounded in chest. Impaired note rt. base and faint breath sounds. X ray suggests pleural adhesions.
50	Bronchitis and emphysema.
51	In-patient in Brompton Hosp. Aug., 1918. Not diag. No a.p.s. Very thin. Clubbing of fingers. ? diag.
52	Signs of cavity rt. apex. Offensive sputum. T.B. –ve 5 times. Diag. apical bronchiectasis.
53	No a.p.s.
54	Former in-patient Brompton Hosp. No a.p.s., then or now.
55	Diag.: "Chronic mouth-breather and traumatic kyphoscoliosis."
56	Bronchitis, emphysema, and asthma.
57	Bronchiectasis and emphysema.
58	Syphilis. Blood sent for a Wassermann reaction (+ve).
59	No a.p.s.
60	Bronchitis.
61	,,
62	No cough, expectoration, or loss of weight. Hæmoptysis estimated by patient at 1 pint month ago.
63	Bronchitis. Blood sent for Wass. (–ve).
64	No cough, expectoration, or hæmoptysis. States loss of weight. No a.p.s.
65	T.B. said to have been found in sputum outside, neg. five times as in-patient. No a.p.s.
66	Bronchitis and emphysema. History of pulm. tub. 11 years ago.
67	No a.p.s.
68	No a.p.s. States loss of weight.
69	Phys. signs indefinite; crepitations at rt. apex, which cleared up. Clubbing. Very little cough or expectoration now.
70	No a.p.s. Cough for 6 months.
71	No a.p.s. now. Bronchitis on and off since childhood. Diarrhœa and vomiting now.
72	Bronchitis and asthma.
73	Emphysema.
74	Bronchitis for 3 years.
75	Hæmoptysis 3 years ago. No a.p.s. then or now.
76	Has scattered crepitations at both bases.
77	No a.p.s. Had bronchitis in 1917. Loss of weight.
78	Said to have had T.B. in sputum 1914 on one occasion. Never confirmed on several exams. since. No a.p.s. then or now.
79	Gunshot wound of chest.
80	Pleurisy rt. base.
81	No a.p.s.
82	? Syphilis of lung. Dullness bronchial breath sounds. Râles, &c., over rt. upper and lower lobes and lt. upper lobe. Sputum repeatedly – ve for T.B. Wass. reac. pos.
83	No a.p.s.
84	,,
85	,,
86	No symptoms, only a.p.s. were ? a few fine crepitations at rt. apex.
87	Slight cough. No sputum. Impaired note and weak breath sounds lt. apex.
88	No a.p.s. No sputum.
89	No a.p.s. No sputum. Diag. "debility."
90	Child of 11. Cough "always." Pneumonia 5 times. No a.p.s. now.
91	No cough or sputum. ? hæmoptysis Jan., 1920.
92	Diag. "fibrosis of lt. lung, ? cause." Girl of 18.

was in 1916 and 1917 suffering from active pulmonary tuberculosis. On clinical grounds it would appear at present to be a case of arrested pulmonary tuberculosis. In the other case the evidence was not quite so conclusive, but it was definitely stated that T.B. were present in the sputum on one occasion at least.

The peristence of antibodies in the blood after the arrest of the disease is in conformity with what we know of immunity in other pathological states, and it will be a point of interest to follow up such cases to determine the duration of such persistence of antibodies in tuberculosis. This consideration does not in any way affect the reliability of the test as a means of diagnosis of active tuberculosis if it be borne in mind that a positive result indicates the presence of a tuberculous lesion which is active at the present time or has been so within a recent date.

2. *The significance of a positive reaction.*—The above results do not support the view that the presence and intensity of the reaction is in any way dependent upon the actual size of the lesion, for a positive reaction is obtained apparently in the very earliest stages of the disease, before the appearance of physical signs by which we may estimate the size of the lesion, but when presumably it is very small. But it is definitely upon the present or recent activity of the lesion that the presence of the reaction depends. The alleged tuberculous infection in early life, which has been used as an explanation of the large percentage of positive results obtained in adults by the von Pirquet reaction, does not cause a positive complement-fixation reaction to be given.

3. *The bearing of the results upon the serological uniformity of the human type of tubercle bacillus.*—The possibility of the existence of several "types" of the bacillus is at present fully appreciated, and much statistical evidence has been collected recently by Dr. J. Brownlee which appears to support this view. But in so far as these experiments have any bearing upon this question the results appear strongly to support the view of the serological uniformity of the human type of the tubercle bacillus.

Conclusions.

The conclusions to be drawn from these results are:

(1) That in the complement-fixation test we have a specific means of diagnosis of the presence of an active or recently active tuberculous lesion.

(2) That a negative reaction is as reliable an indication of the absence of such a lesion as a positive reaction is of its presence.

(3) That a positive reaction in the highest dilution only of complement is just as reliable an indication of the presence of such a lesion as a positive reaction in all three dilutions.

In conclusion, I wish to express my great appreciation for the assistance that my colleagues, Dr. L. S. Burrell and Dr. A. Hope Gosse, have given me in carrying out this work, not only in helping to supply me with material, but also in giving me the value of their opinion on the clinical condition of those cases under their care.

I should also like to thank the other members of the visiting staff of the Brompton Hospital for their permission to make use of the cases under their care, and the residents at the hospital for their assistance.

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Clinical Notes:

MEDICAL, SURGICAL, OBSTETRICAL, AND THERAPEUTICAL.

A CASE OF DEFECTIVE SLEEP-SHUNT.

BY E. W. SCRIPTURE, M.D.

ONE of the conditions that render sleep possible is the shutting off or shunting of the impressions from the senses. The mechanism is often very efficient. Many people can sleep in the bright sunlight, or close to a railway, or on the hard ground. Most people are not disturbed by daylight in the bedroom, by crowing cocks, or by hard beds. The following case of defective mechanism is perhaps a rare one.

The patient, a man over 50 years of age, as far as his memory goes has suffered as he does now. He is awakened by the first light of dawn. The rattling of a window, a step in the hall, a word spoken in a neighbouring garden, a bird on a distant tree, or any other slight noise will wake him. The pressure of his body on the bed produces, after about 10 minutes, painful sensations that oblige him to turn from one side to the other all night. The sensations from the digestive organs produce constant nightmares. He has been told by various doctors to take bromides or veronal, to drink much beer, to change his diet at night, to put up with the condition as he seemed to keep healthy under it, to stop letting his imagination play the fool with him, and so forth. He has tried all these methods, singly or in combination. Bromides have little effect; veronal was considered dangerous. The beer cure worked excellently in Munich; three pints of lager produced a pleasant sleep with no headache or drowsiness in the morning. A single glass of English beer, however, gives him a disturbed sleep and a muddled head for the day after. Eating produces dreams; starvation wakes him up. An attempt at the attitude of resignation produces a most doleful mental outlook. He underwent a long treatment by hypnotism, with some improvement. Psychanalysis did not achieve much. He has been forced to rely on his own devices for protection, and he has developed a number of defences. He always sleeps in an attic room with a window away from the road. When travelling he gets a room on the top floor at the back. He wears a special blinder at night made of a silk band stuffed with down; this fits pleasantly and tightly over the eyes. To counteract the joint sensations he formerly used a number of small down pillows packed around the feet and knees. He can now dispense with them by sleeping directly between blankets on a very soft bed.

The defence against noises has been especially difficult. The natural thing would be to stop up the ears. The difficulty lies in finding a substance that is dense enough to keep out the sound and yet so comfortable that the ears do not feel it. Although Ulysses sealed the ears of his sailors with wax when about to pass the sirens, no one seems to have followed up his idea. The antiphones devised before or during the war were hard, uncomfortable substances that could not fit the ears properly; soft things let the sound through. For 30 years this man has experimented with different kinds of wax and similar compounds. The best kind he finds to be the ordinary hard paraffin used for microtome mounts. A pellet held in the fingers soon becomes soft. Placed in the ear it seals it tightly and yet remains so soft that it is not felt.

The condition remains unexplained. One might consider it a reversion to ancestral type of the period when the savage could sleep in safety only if the slightest alarm would wake him. Or it may be that the sleep-shunt mechanism received some injury in early life; the psychanalyst probably has a suggestion ready.

New Cavendish-street, W.

(Continued from previous page.)

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A CASE OF
ECLAMPSIA IN MIDDLE PREGNANCY,
TREATED BY VAGINAL HYSTEROTOMY; RECOVERY.

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ECLAMPSIA is a disease not uncommonly met with in the latter weeks of pregnancy, but it is a decidedly rare complication of middle pregnancy. In my patient it occurred at the twenty-fourth week, and this fact, together with other unusual features, has prompted me to record the case.

Mrs. S., a primigravida, was admitted to Queen Charlotte's Hospital on July 28th at 6.30 P.M. The history obtained was that she was quite well until June, when vomiting became severe, associated with swelling of ankles. This cleared up and she was well again until July 26th, two days before admission, when she suddenly developed a severe headache, with stabbing pains in the right eye. This continued during the 27th, and in the afternoon of the 28th she is said to have had three fits. No account of previous renal disease or zymotic infection could be obtained.

On examination she was found to be in a very restless, noisy condition, requiring restraint, and was quite irrational. She presented the appearance of cerebral irritation, following a head injury. The fundus uteri reached the lower border of the umbilicus, and the last menstruation was stated by relatives to have occurred in January. Temperature was 97·6° F., pulse 108, and blood pressure 135 (a dose of veratrone, ½ c.cm., having been given prior to admission to hospital).

There was slight œdema of the legs and face, and the colour was fairly good, without cyanosis. The bladder contained 12 oz. of urine, which gave the following analysis: sp. gr., 1024—reaction, acid; urea, 1·5 per cent.; chlorides, 0·16 per cent.; ammonia, 0·097 per cent.; acetone, nil; diacetic acid, nil; albumin, 0·035 per cent.; deposit—epithelial cells, leucocytes, numerous granular casts.

Having regard for the serious prognosis of eclampsia at so early a date of pregnancy, I decided to evacuate the uterus as soon as the bowel had been thoroughly washed out. Morphia, 1/6 gr., was given to control the restlessness, but no further dose of veratrone was given, as the blood pressure remained at 135 mm. At 8.45 P.M. I performed vaginal hysterotomy by the usual procedure of reflecting up the bladder above the internal os and making a single incision up the anterior wall of the uterus. Version was done and the fœtus easily extracted by the breech. The placenta and membranes having been removed, the incision was sutured with chromic catgut. As hæmorrhage was severe and the uterus remained lax during the insertion of the sutures, 1 c.cm. of pituitrin was given and the uterus douched. The fœtus weighed 1 lb. 6 oz. and was 10 in. long.

During the night, ten hours after delivery, the sister reported a fit, and the blood pressure had risen to 175 mm., for which ½ c.cm. of veratrone and ¼ gr. of morphia were given. The blood tension fell to 156 by 7 A.M. and later to 135 and 140, at which level it remained permanently. There were no more fits, but the patient remained in a restless irrational condition all the next day (29th), but regained complete consciousness on the 30th. A trace of albumin remained until August 10th, but the convalescence was uninterrupted, the temperature never reaching 100° F. The lochial discharge was scanty and disappeared early.

The patient was discharged from hospital on the eighteenth day.

Remarks.

In an analysis of the frequency of eclampsia at different periods of pregnancy Petersen[1] gives the incidence of the disease at the fifth month as only 8 cases in 499, or 1·6 per cent. Among these 8 cases there were no deaths, but among 29 cases occurring at the sixth month the mortality was 34·5 per cent. All the patients were treated by vaginal hysterotomy.

The prognosis of eclampsia in early pregnancy is undoubtedly more serious than in late pregnancy, and it is probable that radical treatment will yield the best results, but at the fifth and sixth months rapid evacuation of the uterus is a different problem from that which obtains at term.

At the end of pregnancy, abdominal Cæsarean section offers a safe and rapid method, but when the height of the fundus reaches only to the neighbourhood of the umbilicus the vaginal route alone should be considered. Evacuation by dilatation and digital manipulation can be an extremely difficult and prolonged operation, involving danger to the patient from anæsthetic poisoning, shock, and hæmorrhage. Vaginal hysterotomy, however, can be finished in half an hour or less; it involves no tearing of the internal os, there is ample room for the removal of fœtus and placenta, and the uterine incision is accessible and easy to suture. For cases which require rapid evacuation of the uterus before the seventh month this operation gives the quickest method, together with the minimum of trauma and shock.

[1] Petersen: Trans. Am. Gyn. Soc., 1911, vol. xxxvi.

Reviews and Notices of Books.

ANIMAL EXPERIMENTS AND SURGERY.

Hunterian Lectures delivered in February, 1920. By WALTER G. SPENCER, M.S., F.R.C.S. University of London Press, Ltd. 1920. Pp. 180. 6s. net.

Mr. Walter G. Spencer's Hunterian lectures on Animal Experiments and Surgery have been recently published in a small book, which should make instructive reading both for surgeons and for the wider public interested in surgical progress. The matter in the lectures was originally gathered in the course of combating the Bill for preventing experiments on dogs, which was laid before Parliament in the summer of 1918 and was eventually defeated. The lectures do not, however, savour of propaganda. The first in the series seeks to present in historical sequence the chief experiments on animals on which the steps in the progress of surgery have been founded; the second describes those experiments which were directed towards the application of surgical methods to the treatment of the individual structures of the body, and includes the transfusion of blood and infusion of various fluids into the circulation, operations on the heart and vessels, anastomosis of the intestine and the treatment of intestinal obstruction, and operations on other abdominal organs; the third deals with more recent refinements in surgery, such as operations on the nerves, brain, ductless glands, and kidneys, and the discoveries upon which is based the treatment of various infective disorders.

To those surgeons who have been content to remain in ignorance of the early history of their craft it will probably come as a surprise to find how much of the pioneer work in surgery was done by Galen in the second century A.D. This writer is chiefly remembered as an anatomist, the account of his numerous original experiments being scattered through his anatomical treatises, and so having been generally overlooked. Yet Galen, whose name is often a catchword for dry antiquarianism, was the originator of surgical operations on the great vessels, heart, brain, bladder, and ureters, as well as being an expert investigator of muscular function and of localisation of function in the brain and spinal cord. On many occasions he defeated the incredulity of opponents by his use of the experimental method, employing for his object various animals, such as dogs, pigs, goats, and monkeys. For centuries all surgical teaching was based on his discoveries, and in several cases the full import of his work was not realised until quite recent years.

The next great experimenter on animals was Vesalius, who, working in the first half of the sixteenth century, supplemented the discoveries of Galen and greatly extended knowledge of physiology and surgery. Some of his most striking experiments were on the heart and lungs, and he was probably the first surgeon to expand a lung artificially after the thorax had been opened. A number of investigators, notably in Italy, followed up the impetus given to experimental research by Galen and Vesalius, and the development of medical science spread by this means to England, Holland, and Denmark during the seventeenth century. In Germany during the eighteenth century Albrecht von Haller was the leading exponent of the value of experiments on animals, but his surgical diffidence was remarkable. "Although entrusted," he wrote, "with a chair of surgery for seventeen years, and although I have frequently given surgical demonstrations, I have none the less never borne to cut a live man lest I should do too much harm." At the same time progress by experiment was going on in England and France, so that in the nineteenth century surgery was able to enter on a new phase, culminating in the discoveries of Pasteur and Lister. Mr. Spencer has, however, found it necessary to emphasise the fact that after the time of Astley Cooper experimentation was much neglected in England, so that we fell behind France and Germany in our knowledge and skill. The statement by Erichsen in 1874 that "surgery has attained its highest plane and reached its limit of usefulness" appears to have typified the English attitude at that time, though fortunately during the years that followed complacency gave way to progress, due largely to the work of surgeons, such as Horsley and MacEwen.

At the conclusion of his first section Mr. Spencer has rightly drawn attention to the handicap under which surgeons in Great Britain labour in being forbidden to acquire manual skill by means of practice upon animals. Horsley did his best to overcome this in his evidence before the Vivisection Commission in 1907, but without avail. The direct consequence of this is that most surgeons have to acquire their manipulative experience chiefly at the expense of their patients, since it cannot be maintained that operations on the dead body, even if there were to be extended facilities for these, are of much value in the acquisition of technical skill. Mr. Spencer mentions, as outstanding instances of this unsatisfactory state of affairs, the performance of tracheotomy on a child, of the radical cure of a hernia in a baby, and of operations on the eyeball, all of which might readily be learnt by practising on anæsthetised animals. Almost the whole range of abdominal surgery might be included in the same category, and the technique of the surgery of the chest, which is still in its infancy, might sooner reach maturity were British surgeons granted the same opportunities that were enjoyed by Galen 1800 years ago.

It is apparent from the brief summaries contained in Mr. Spencer's second section that very few advances in surgery have been made without the aid of preliminary experiments on animals. The first successful cholecystectomy was performed on a dog by Zambeccari in 1680; splenectomy, though practised by the ancients, was not established as a feasible operation until 1872, when Mosler thoroughly investigated the results of the operation in rabbits. Similar instances, too numerous to mention here, are to be found in Mr. Spencer's book; his excellent summaries should be of great service in the future to the trustees of research, and they will also be used for reference by those interested in the historical aspect of the various branches of surgery.

INFECTIOUS DISEASES.

A Practical Text-book. Second edition. By CLAUDE BUCHANAN KER, M.D., F.R.C.P.Edin., Medical Superintendent, City Hospital, Edinburgh, &c. London: Henry Frowde and Hodder and Stoughton. (Oxford Medical Publications.) 1920. Pp. 628. £2 2s.

As ten years have elapsed since the appearance of the first edition of this text-book it may not be amiss to note the exact scope of the work. The title might lead to the expectation of a considerably wider field than is actually covered by the author, who confines himself to the diseases commonly met with in public infectious hospitals in the British Isles. Indeed, in the present volume we find that the one rare disorder dealt with in the former edition, relapsing fever, has been omitted. Cerebro-spinal fever finds a place, but not acute poliomyelitis. A somewhat remarkable omission is that of influenza, which has so recently demonstrated its gravity as an infectious disease.

The first chapter of the book is devoted to a general consideration of infection, immunity, and fever. We note that the author now tends to accept the existence of a connexion between the incubation period of a disease and the phenomena of anaphylaxis suggested by us in a former review of this work. He also admits some scepticism as to the value of the ordinary processes of disinfection of rooms after outbreaks of infective fevers, and notes that equally good results are obtained by simple cleaning and ventilation. The later chapters deal with the individual diseases, and the author has maintained the practical point of view adopted in the former edition, and has only discussed the bacteriology, or rather parasitology, of the affections so far as is necessary from the clinical aspect. It is, indeed, noteworthy that the common specific fevers remain an *opprobrium pathologiæ* in so far as their exciting causes are still unknown. When these are identified, much of the difficulty at present

experienced in distinguishing between measles, rubella, and scarlatina will in all likelihood be a thing of the past, whereas so long as diagnosis depends on mere cutaneous manifestations, it will always remain uncertain, and the question of the existence of some fourth or fifth closely allied affection will admit of no definite answer. In the book before us the author keeps an open mind as to the reality of Dr. Clement Dukes's fourth disease, but considers the evidence so far adduced unconvincing. As an empirical aid to diagnosis Dr. Ker has seen good results in using the Rumpel-Leede test for scarlatina—the production of small petechial spots by application of a fairly tight bandage round the arm. On the other hand, he notes that the Widal test is unreliable as a means of distinguishing typhus from typhoid, as it may often be found positive in the former malady—a somewhat curious condition, as there seems no reason to attribute typhus to any organism related to the *B. typhosus*. In the section on diphtheria we find that tracheotomy is still regarded by the author as preferable to intubation in private cases, as medical aid may not be immediately available if the tube is coughed up. He discusses the value of active immunisation with toxins as a prophylactic for this disease, but there seems little scope for this method in view of the efficacy of a preventive dose of antitoxin in the presence of an epidemic; the latter procedure does not induce the risk of a preliminary negative phase, which seems theoretically probable after an injection of a toxin or vaccine.

We can cordially recommend this book as a useful practical guide to the treatment of infectious fevers in these islands. It embodies the ripe experience of an observant physician, adequately supplemented by a study of recent contemporary literature.

CUNNINGHAM'S MANUAL OF PRACTICAL ANATOMY.

Vol. III. Seventh edition. Head and Neck. Revised and edited by ARTHUR ROBINSON. London: Henry Frowde and Hodder and Stoughton. 1920. Pp. 568. 12*s*. 6*d*.

THIS is the remaining volume of an edition which we have already noticed, and is a worthy companion of the two other members. The illustrations are again outstanding features, and include many radiographs. The three volumes make a beautiful and complete work of reference, possibly more suitable for functioning in that capacity than for the needs of the average student, who has little time to loiter in the pleasant by-ways of anatomy.

THE TREATMENT OF SYPHILIS.

By H. SHERIDAN BAKETEL, A.M., M.D. New York: The Macmillan Company. 1920. Pp. 167. 13*s*.

THE author gives a clear account of the treatment of syphilis, with special regard to intravenous medication, the technique of which is too often neglected in text-books. This deficiency Dr. Baketel has remedied by his detailed account of the methods employed in the clinics under his charge. The standard the author sets is a high one. Whilst it affords an ideal at which every syphilologist should aim, we must confess that the time demanded for the carrying out of the excellent technique described by Dr. Baketel makes it difficult of attainment in many of the overworked and understaffed clinics of this country.

A clear and interesting précis of the history of arsphenamin is given in the opening chapters. Dr. Baketel traces the progress of arsenical medication from the days of atoxyl, and gives a brief account of the chemistry of arsenic compounds. Methods of administering mercury and iodides are also described. In the later chapters the treatment of congenital, visceral, and nervous syphilis is discussed, as also the question of reactions and accidents following the use of arsphenamin. Finally, the difficult subjects of cure and of marriage are approached. With regard to the latter, the author lays down the rule that no man should be allowed to marry until repeated examinations of blood and cerebro-spinal fluid have demonstrated that the spirochætes have been absolutely eliminated from the system. "A man with a positive Wassermann, even though it be caused by an aortitis or a lesion of the spinal cord, should not marry or endeavour to procreate."

The book is well illustrated, and every step in the procedure of intravenous injection can be followed in the plates. It is altogether an excellent guide to anyone desirous of attaining a good technique in the treatment of syphilis.

AIDS TO OSTEOLOGY.

Second edition. By PHILIP TURNER, B.Sc., M.B., M.S., F.R.C.S. Students' Aid Series. London: Baillière, Tindall, and Cox. 1920. Pp. 187. 4*s*. 6*d*.

As a concise summary of the main facts in human osteology this little book is a good member of the series to which it belongs. It will, doubtless, prove of value to the ordinary student who wishes to revise the subject of "bones" before an examination. A large amount of information is compressed into a small space; the descriptions are formal, and the English nomenclature is used. We must point out, however, that Albrecht's suggestions about the ossification and formation of the premaxilla are discredited, and the modern teaching of the development of the maxilla and mandible differs from that given in this book.

DUTIES OF SISTERS IN SMALL HOSPITALS.

By FELICE NORTON. London: Baillière, Tindall and Cox. 1920. Pp. viii. + 75. 4*s*. 6*d*.

THE practical experience gained in a small hospital may be a priceless asset in a nurse's career, but whether this is so or not depends largely on the tact, efficiency, and ethical standard maintained by the sisters in it. Miss Norton's book may serve as a model to those upon whom the training of probationers devolves. The author has incorporated within the limits which she has set herself sound and practical advice, and we recommend her injunctions to every nurse who is about to assume the responsibilities of a sister's post.

X RAY ATLAS OF THE SYSTEMIC ARTERIES OF THE HUMAN BODY.

By H. C. ORRIN, O.B.E., F.R.C.S. Edin. London: Baillière, Tindall, and Cox. 1920. Pp. 92. 12*s*. 6*d*.

THE author has devoted a large amount of time and ingenuity to the production of the very beautiful plates which form the basis of this book, and he has demonstrated the possibility of injecting, for X ray work, even the smallest arterial branches; this is particularly well seen in the photograph of an adult hand. The work, as a whole, was done on a fœtus owing to difficulty in procuring an adult cadaver. While admitting at once the clearness and value of the plates, the success of the author's methods, and the interest of the relations thus brought out between the vessels and the skeleton, we nevertheless confess that this sort of work seems to us to be of relatively little value from an anatomical standpoint. The plates show nothing that is not known and taught by the usual methods; in fact, they necessarily show an incomplete picture. Surgically the relations between bones and vessels are not by any means the only important ones, and X ray work, so far as it goes at present, cannot give an adequate idea of the relations existing between the arteries and the soft parts. We doubt whether the mere demonstration of continuity between vessels is, from an anatomical point of view, of importance sufficient to outweigh the absence of all those other "relations" which make up a knowledge of the anatomy of the arteries; there is a tendency at present to magnify the value of X ray work in anatomy, and to allow it to assume in this subject a position to which it has no justifiable right. This said, we can commend without further reserve a book which could be placed with advantage in the hands of a student together with his ordinary anatomical manuals. The letterpress accompanying the plates is a concise summary of distributions and branches.

THE LANCET.

LONDON: SATURDAY, SEPTEMBER 25, 1920.

Post-Graduate Medical Study.

A FEW weeks ago our Vienna correspondent wrote of a series of post-graduate lectures to be delivered in that city during the present summer months, covering the whole range of medical and surgical knowledge and open to medical graduates of all countries. He added that English readers would be interested to learn that American doctors were coming to Vienna and that a considerable number of them had already booked places for the approaching winter term. Our readers will therefore be not unprepared for the item of news which Mr. GEORGE E. MACLEAN, director for England of the American University Union in Europe, communicates to our correspondence columns. A committee in Chicago has organised an excursion for physicians to go to Vienna for study in the way that American physicians were accustomed to do before the war. No one, we think, can grudge the improvement in economic conditions which makes it just possible for professors and tutors to keep themselves from starvation by giving of their best to medical brethren from other lands; least of all this country, which, next to America, has contributed so largely to the rehabilitation of its Austrian colleagues. A multitude of grateful pupils will welcome any sign that medicine begins to feel its feet again in Vienna.

But this is not to say that post-graduate medical study on the continent of Europe will have the same easy pull over the attractions provided in this country that it had a decade or two ago, when the continental habit was formed. Everything points the other way. The arrangements for medical education in this country are changing like a kaleidoscope, and the alteration would be astounding to anyone who could picture vividly the difference between the mental pabulum and the facilities offered in 1920 and those of 1900, when post-graduate instruction had practically not come into being. Hardly a week now passes without the announcement in our columns of some new and attractive object of study for those who have obtained a legal qualification. Last week it was a course for general practitioners to be given at St. Andrews under the direction of Sir JAMES MACKENZIE; the issue before it was a post-graduate week at Oxford in early October to be addressed by Sir ARCHIBALD GARROD and Professor G. DREYER. Successful post-graduate courses have been conducted during the past year at Glasgow, Sheffield, Birmingham, Manchester, and other university centres. It is the gracious task of the Fellowship of Medicine, associated with the Post-Graduate Medical Association, to be the centre of exchange for all existing facilities and for others as they come into being. It should be a matter of common knowledge that a Fellowship ticket costing four guineas a month entitles the holder to attend the clinical practice, including practical demonstrations and laboratory work, at the 12 great London medical schools and at 25 special hospitals in the metropolitan area. The weekly bulletin of the Fellowship contains a time-table which shows at a glance where and by whom the classes and demonstrations are given. It is, of course, an essential condition of a successful ticket office, on the one hand, that the functions for which tickets are issued should actually take place, and, on the other, that when they do take place visitors should be present in sufficient numbers to justify the trouble which the performers have taken. Complaints on both these scores have reached us from time to time. During the holiday season especially it is natural that teachers of distinction should not be found at their posts, but it has happened—and it should not happen—that fixtures announced in the bulletin have not taken place. Other demonstrations arranged with care and forethought have remained practically unvisited. It is easier to see and regret these difficulties than to avoid them. In any case they are but the ripples on the surface of a great volume of arrangements satisfactory alike to teacher and taught.

It is in this respect that the continental plan of a special and detailed scheme of post-graduate study in all its branches has an apparent advantage. Such courses in Vienna are arranged solely and entirely for the convenience of graduate students. Patients are brought from all parts of the city to a central clearing-house, where they are classified and arranged without any particular consideration for the human material. Medicine is not tending that way in this country, where teacher, student, and patient form a trio, each of whose needs is considered and subordinated if need be to those of the others. The continental plan, as we may briefly call it, does away with the social and economic setting of the patient, a factor of ever-growing interest and importance. It would be quite possible to build up such a system in London, and when it was done it would resemble the annual view-day, which is such a travesty of normal hospital routine. We offer a word of encouragement to those who have suffered from the minor inconveniences of sight-seeing. The sights are there right enough, but each student must be content to be in a measure his own cicerone. His reward will be that when he gets there he sees the real thing and not a puppet-show. The Fellowship of Medicine is on the right lines in following an indigenous plan. Development is proceeding. The attachment to each medical school of a complete post-graduate scheme with clinical assistantship appointments for practitioners is undoubtedly the ideal to be aimed at, and will come in the fullness of time. The concentration of post-graduate teaching around some of the new clinical units in our London schools is, as our special article last week indicated, becoming an actual reality. Further opportunities will naturally grow out of the work in hospitals and clinics now steadily being created throughout the country. Soon we shall have nothing to fear from comparisons.

End-results in Nerve Injuries.

Sir WILLIAM THORBURN concluded an introductory address to the Section of Surgery at the annual meeting of the British Medical Association with the words: "If a surgeon obtains 50 per cent. of really good economic recoveries after secondary nerve suture he is doing well; if he obtains 75 per cent. of such recoveries his work is both brilliant and fortunate." A careful study of his address, which appears in our present issue, shows that he did not himself look at the picture of nerve surgery through rose-coloured glasses; and, in

view of the many patients attending hospital at the present day after nerve suture, it is clear that his reservations are justified. The question which indeed arises is whether Sir WILLIAM THORBURN is himself not optimistic—whether his "50 per cent. really good economic recoveries" is possible of realisation, in consideration of the severity of gunshot injuries of nerves. It is everyday experience that after suture of the musculo-spiral nerve such a recovery rate may be anticipated, and an approximate but lesser degree of recovery after operation on the sciatic nerve, but the observed results after suture of the median, and more especially the ulnar, nerves seem to show that the surgeon must be both brilliant and fortunate to obtain such good numerical results. Few branches of surgery require more anatomical knowledge and greater specialised skill than nerve surgery. The results hinge on detail—cleanliness, hæmostasis, delicacy in handling the nerve itself, and an exact knowledge as to how the attendant difficulties (and there are many) are to be overcome. Some of the unfavourable results may be due to want of this exact skill and knowledge. The busy surgeon is still apt to regard the case as finished when the stitches are out, regardless of the fact that the preliminary stage alone is completed. But even after making such allowances we must admit that, with the exception of the musculo-spiral and sciatic nerves, the results of secondary nerve suture are disappointing. Before the war the idea was prevalent that end-to-end suture was, when possible, desirable. We know now that end-to-end suture must be striven for in the face of all prevailing difficulties. It is the one method which may give a reasonable, perhaps good, functional result. All other methods, in spite of some few successful cases reported, are disappointing. We fear that an investigation of cases under treatment at the various London hospitals at the present time would show that our less sanguine views are justified. It may be argued that the patients attending orthopædic and electrotherapeutic centres are merely the failures, but unquestionably many who are there are striving to obtain a better economic result. It should be clearly borne in mind that a patient suffering from a divided nerve of the size and nature of the median or sciatic is economically useless, and the operator would be wise to study nerve surgery in all its details before he advises and carries out operative procedures. We would add also that all those who are interested in nerve surgery would benefit greatly by studying the many cases of nerve injury attending the out-patient departments of pensions hospitals.

Wilhelm Wundt, 1832-1920.

WILHELM WUNDT was born near Mannheim in 1832. He first devoted himself to the study of medicine, becoming privat-dozent in physiology under HELMHOLZ in Heidelberg at the age of 26. Two years later he published his Theory of Sense-perception, this forming his first approach towards philosophy, to which he had hitherto paid as little attention as does any ordinary student of medicine. This contribution sketched out a programme for the experimental treatment of psychology that WUNDT afterwards did so much to foster. Hitherto experiments bearing on this youngest of the children of philosophy had been made exclusively by physiologists for physiological purposes, or in the case of FECHNER for its psycho-physical interest. Under the stimulus of HELMHOLZ'S great works on hearing and vision WUNDT'S psychological studies led to his lectures on the human and animal mind (1863), in which he made his first reference to the bearing of ethnology on psychology. The first edition of his Physiological Psychology appeared in the following year. After a brief activity in Zurich as professor of "inductive philosophy," WUNDT was called to Leipzig, where he remained till his death. As he declared in his introductory lecture there, his constant effort was to construct a unitary vision of the world in all its aspects, but—unlike many philosophies of the past—in constant affiliation with the methods and results of all the sciences. In view of the then recent collapse of the Hegelian philosophy, which presumed to construct the universe and all its history out of the self and its logic, that effort showed a wise restraint, calculated to restore philosophy to its due place of honour among the mental and spiritual products of man's urge towards thought. But if the source and methods of previous German philosophy were thus abandoned, the range and bulk of production taken by its professor as an ideal of attainment was rather increased. WUNDT traversed the whole field of philosophy in long works of numerous volumes, as well as in countless papers in journals. His Physiological Psychology reached its sixth edition in three large volumes in 1908. His Logic appeared in 1880–83, and reached its third edition in three volumes in 1906. There are besides: Ethics, 1886—third edition, two volumes, 1903; System of Philosophy, 1889—third edition, 1907; Anthropology, in six volumes, from 1900 on—now in second and third editions; The Sensuous and Supersensuous World, 1914. His output was enormous.

The first institute of experimental psychology was founded in Leipzig by WUNDT in 1879. From it proceeded a great number of the senior professors of psychology of the present day. In America his pupils are specially numerous, of whom TITCHENER has perhaps come nearest to the stature of his teacher. The work of WUNDT'S laboratory is conserved in his "Philosophische Studien" and in the following "Psychologische Studien," as well as in journals. WUNDT'S psychology embodied the results of these investigations, far too exclusively indeed, as prominent German psychologists have admitted. His exposition was practically a psychology of the Leipzig studies, which have too often failed to stand the test of rigorous examination. STUMPF, the foremost exponent of the psychology of hearing, made short work of their efforts in audition. For this reason WUNDT'S labours in psychology have had less influence than their bulk would suggest. The citadel of his laboratory was so built that for most travellers at least the gate of orthodoxy was the only road to graduation or study. That, of course, is so universal as almost to be inevitable in what is called a school in philosophical circles, and psychology has not shaken free of this pernicious tradition. In his effort to make all the sciences—natural, mental, and logical—converge to form an approximately and temporarily complete philosophical system WUNDT'S philosophy has gained the greatest respect, and is on the safest lines, however striking the efforts of one-sided extremists may be—when they are successful. The man who stakes his all on a conviction risks total obscurity for the chance

of progress and immortality, while enormous mediocrity can at most oppress us only until the sciences roll us away from it. Some of WUNDT'S colleagues have compared him, as a mind uniting in itself all the knowledge of its time, with ARISTOTLE or LEIBNITZ. But there was not in him anything so unique and distinctive as there was in LEIBNITZ. The thought of centuries will hardly be compelled to focus itself on WUNDT for one of its characteristic and insuppressible synthetic possibilities.

WUNDT was of pleasing and gracious personality. His style of lecturing was objective and plain, his conversation courteous and direct. He was severely abstemious, living solely for intellectual capacity. His lectures were crowded to the limits of the auditorium, as he was an outstanding feature for all Leipzig students. The year 1914 was a difficult time for a philosopher. To the regret of those who knew him, the intellectual conscience that had often allowed his zeal for production to outrun his care for exactitude and his fair judgment permitted WUNDT to write about the spirit of British and French philosophy in a way calculated to bring them into contempt. France had sold her soul for honour, England for money and social power, while Germany alone was striving for an ideal. Even NIETZSCHE was cited as a witness. Thus did philosophy fail the octogenarian philosopher.

Annotations.

"Ne quid nimis."

WAR-ADAPTED ASYLUMS.

THE History of the Asylum War Hospitals in England and Wales, presented as a report to the Home Secretary by Sir Marriott Cooke and Dr. C. Hubert Bond (H.M. Stationery Office. Price 9*d*.), sets forth the services rendered to the wounded and sick during the war by the asylum authorities throughout England and Wales under the direction of the Board of Control. During 1915, from certain selected asylums the insane patients were removed and the institutions so vacated were adapted, equipped, and organised as general medical and surgical military hospitals. The scheme when fully developed supplied 24 hospitals which, without exception, were acknowledged by all the many expert authorities, military and civil, and other competent judges who inspected them to have afforded facilities for treatment in all respects equivalent to those available at the best military and civil hospitals in the country. These 24 hospitals provided, with some hutments, as many as 27,778 permanent beds; and when the extension by camps and the temporary beds used in times of special pressure are taken into consideration, could accommodate over 31,000 patients. The number of patients treated in them to the date of this report has been 482,949, approximately equivalent to one-sixth of the total number of sick and wounded men from all fronts during the war. The selection of asylums was based upon the principles that they should be of comparatively modern construction and suitable for use as general hospitals; that they should be accessible by rail and in proximity to large towns where physicians and surgeons should be readily available; that the asylums should be arranged, according to their geographical situation, in nine groups, and that from among each group one asylum should be converted into a war hospital, while the other asylums in the group should receive all the insane patients belonging to the vacated asylum; and that although the insane patients might suffer some inconvenience, the receiving asylums might for the time be overcrowded to the extent of 20 per cent. of their normal accommodation. In the short space of a few weeks the nine asylums had been cleared of their insane patients, excepting a few who were to carry on the farm work or who were too ill to move. This rapid transference of some 12,000 patients, including many dangerous and violent cases and many who were aged and feeble, was effected without any untoward incident. It is sad, but consoling, to learn that many of the patients exhibited sorrow on being obliged to leave institutions which had, in some instances, been their homes for years, and that the mutual regret shown by patients and by members of the staffs on parting was pathetic.

The adaptation, equipment, and organisation of the asylums as war hospitals were undertaken by the visiting committees of the several vacated asylums, as well as the collection of the requisite additional staff and the carrying on of the business side of the administration of the hospital, including the settlement of contracts for the supply of food and necessaries for patients and staffs. The adaptation included the removal of everything in the buildings which might have been objectionably reminiscent of their normal purpose, the provision of operating-rooms, of X ray apparatus, accommodation for additional staff and stores, and occasionally the alteration of roads to provide easier access for ambulances. In the matter of the staffs the medical superintendent became officer commanding and administrator; the senior assistant medical officer became the registrar and usually acted as deputy to the officer commanding; the other assistant medical officers, ineligible for foreign service, or not as yet released for it, were given posts on the medical staff of the hospital. Where the matron had had full training in a general hospital she was made matron of the hospital. All the asylum nurses, however great their experience in nursing bodily illness among insane patients, were classed as probationers, and had to work—sometimes in wards of which they themselves had had charge—under the sisters and trained hospital nurses, a trying position for them. To the male asylum attendants was given the orderly work in the wards and elsewhere in the hospital, as well as the duty of acting as male nurses when necessary. The services of the best operating surgeons and physicians in the locality of each hospital were secured as visiting surgeons and physicians, while to the surgical and medical divisions of the hospital were appointed a chief resident surgeon and a chief resident physician.

As the war went on the original number of nine hospitals was added to, and ultimately 24 asylums and kindred institutions were being used as military hospitals, one of them as an United States Base Hospital. In addition to the enormous number of physically sick and wounded patients the large total of 38,440 patients suffering from mental breakdown or nervous diseases had up to May 1st, 1920, been treated either in a section of one or other of the war hospitals or in the seven smaller hospitals, most of which were established later on, and from their inception devoted exclusively to the treatment of soldiers suffering from mental and nervous complaints. Of the 24 hospitals, 17 have now been closed down, and of the hospitals still in operation probably all but four will have closed by the end of this year.

The asylum authorities and officers have a right to look back with satisfaction on the splendid work they were able to do for the country in general, and the sick and wounded in particular, at a time of urgent need.

THE FLUCTUATION OF SCARLET FEVER.

CONSIDERABLE attention has been drawn during the past few weeks in more than one journal to the annual summary issued by the Ministry of Health in respect of the number of notifications in each sanitary district of a variety of infectious disease. Interest has been riveted particularly on two diseases—scarlet fever, the prevalence of which, after an appreciable increase in 1913 and 1914, showed a remarkable decrease in 1917 and 1918, followed by a rise in 1919; and diphtheria, which after some increase in 1914 and 1915, showed no similar reduction in the later war

years. A variety of suggestions have been offered in the public press to explain these perplexing variations in one disease and the equally perplexing contrast with the other common infectious disease, the control of which is commonly regarded as no more difficult than is that of the former. Was the drop in the incidence of scarlet fever in the later years of the war the result of the war, in some way which cannot at present be defined—possibly, for example, by the diminution in the crowding of children, by the transfer of the men to camps and of many women to the residential quarters connected with munition works? Was the incidence of scarlet fever affected by some variation in the prevalence of fleas, which have been suggested by one well-known medical officer of health as a possible channel of infection? One phenomenon, however, appears to have been ignored in many of the comments on this vagary of scarlet fever—that is, the fact that there is a cyclical variation in the prevalence of most of the acute infectious diseases, which was formerly recognised from study of the records of deaths, and which can now to some extent be noted in the national statistics of notifications, which have been collected year by year since 1911. The statistics of incidence, as apart from mortality, do not extend back for a sufficient number of years for the curve of varying prevalence to be clearly indicated. The figures of incidence both for scarlet fever and for diphtheria given by the Registrar-General do, however, distinctly suggest such cyclical variation, and it appears reasonable to assign to the factors behind these normal variations a large responsibility for the low rates of incidence of scarlet fever in 1917 and 1918, which appear to correspond to the trough of the wave between 1914 and the next maximum, possibly to be attained in 1920 or 1921. This in itself is obviously not an explanation of the phenomenon, and no explanation of the changing cycles of prevalence can yet be given, though doubtless some part is played by a variety of known influences. Among these may be mentioned variations in the susceptibility of the population to infection, the susceptibility increasing and approaching steadily towards the point of explosion as the period from the previous outbreak lengthens. Again, it is conceivable that there may be a periodic alteration in the virulence of the organism causing the infection. It is further recognised that the degree of prevalence of the infectious diseases is closely bound up with variations in the conditions of soil and air—variations in the level of underground water, in the earth temperature, and in air humidity. We still await the wide and detailed exposition of the true bearing of these and other influences on the prevalence of the infectious diseases. Meanwhile, we can happily yet proceed, in the hope of an appreciable measure of success, with the business of curbing their capricious visitations.

CHRONIC SEPTIC SPLENOMEGALY.

IN his first Lumleian lecture on the War Experiences of a Physician, printed in THE LANCET of Sept. 11th, Sir John Rose Bradford described an obscure and rare disease of which he had seen two, possibly three, instances. This malady was characterised by a febrile illness having considerable resemblance to enteric fever and lasting several weeks, during which the spleen slowly increased in size to a dimension comparable to that reached in ordinary spleno-medullary leukæmia. Indeed the cases presented considerable likeness to this disease, but differed, in that, after an illness of many weeks, the pyrexia declined, and the spleen slowly returned to normal. Sir J. Rose Bradford states that the nature of these cases is obscure; certain tropical affections could all be excluded, and the search for parasites was negative. They may, however, bear relationship to some cases recently published by Dr. Gordon Ward[1] under the title of "Chronic Septic Splenomegaly." From the large group of splenic anæmias he separates these cases into a class the ætiology of which is not specific, but which, according to him, is well recognised in American literature. The condition may follow the invasion of any of a large number of organisms, but there is reason to suppose that the streptococcus is most frequently responsible, and the primary foci of invasion are usually the intestines, pelvic organs, and nasal cavities. According to Dr. Ward, the cases described in medical literature fall under the following groups: (*a*) Egyptian Splenomegaly, described by Richard and Day, Archibald, Nicolle, &c.; (*b*) Endocarditis Maligna, described by Parkes Weber, Riesman, &c.; (*c*) Oral Sepsis with Splenomegaly (Essex Wynter); (*d*) Enteritis with Splenomegaly (Hollins); and (*e*) others associated with bacillary dysentery, parametric abscess, dental sepsis, and infection of the antrum. The diagnosis is not difficult: blood examination excludes leukæmia, there is no jaundice, nor are there enlarged lymphatic glands. Splenic puncture excludes kala-azar, Gaucher's disease and malaria, while Wassermann's reaction excludes syphilis. Five cases are described by Dr. Ward, in which there was enlargement of the spleen associated with dysentery, parametric abscess, and infection of the antrum of Highmore, the enlargement disappearing when these conditions were cured. In Sir J. Rose Bradford's cases blood examination revealed a condition similar to that seen in splenic anæmia, a diminution in the number of red cells, and a considerable leucopenia, the white count falling to 3000. Dr. Ward gives a very fully detailed account of the blood examination in his five cases. The number of red cells varied between 2,825,000 and 6,670,000, and the leucocytes between 3200 and 17,800; nucleated red cells were rarely seen; polychromatophilia was constant, but by no means marked. This difference in the blood examination seems to us rather striking, and further evidence will be necessary before deciding that Sir J. Rose Bradford's cases and those of Dr. Ward come under precisely the same category.

[1] Archivos de cardiologia y hematologia, May-June, 1920.

PHARMACO-ENDOCRINE THERAPY.

AN official report of the twenty-first annual meeting of the American Therapeutic Society, held at the College of Physicians, Philadelphia, last May, has just reached us, from which it is evident that the presidential address, by Dr. Charles E. de M. Sajous, of Philadelphia, was of more than passing interest. It was in effect a powerful plea for renewal of interest in the science of therapeutics, which appears to be suffering from neglect in America at the present time. His main argument may be briefly recapitulated.

The salvation of therapeutics would depend, in Dr. Sajous's view, upon the degree of curative efficiency it could be made to attain. If the pharmacologist concentrated his efforts upon its main purpose, the cure of disease, by studying the influence of drugs upon our defensive functions, he would stimulate endeavour on all sides. Great confusion in experimental endocrinology and the lack of agreement among workers in this field had led Dr. Sajous to work independently, seeking what light clinical and experimental data might throw upon the subject. His views, derived from the clinic, were often in disagreement with those of physiologists and pharmacologists. With regard to the adrenals, in his opinion clinical experience with the human subject did not bear out the statements of physiologists that therapeutic doses of adrenalin had an inhibitory effect on the functions of the gastro-intestinal canal; in fact, the effect was often quite the opposite. The supposed blood pressure-raising power of adrenalin also proved misleading. Indeed, one of his workers found that if there was one thing that adrenalin *did not* do it was to raise blood pressure.

Dr. Sajous's studies, in accordance with those of other workers, had convinced him that absorption of oxygen from the air in the pulmonary alveoli necessitated in the pulmonary circulation some substance capable of actually appropriating this gas. It was suspected that this substance was some kind of internal secretion, and clinical studies in over one hundred diseases pointed to the adrenals as the source of this secretion, which, after entering the vena cava and passing through the right heart, finally reached the pulmonary alveoli with the venous blood. Here it probably became part of the hæmoglobin, converting it into oxyhæmoglobin. Considerable evidence, both direct and indirect, showed that the adrenal secretion influenced general oxidation and metabolism, increasing the intake of oxygen and the output of carbon-

dioxide. The adrenin present in the hæmoglobin was taken as the real measure of adrenin in the blood—not what the adrenal bodies secrete, which might be nil under normal conditions and excessive under excitement or stimulation. Dr. Sajous suggested that pharmaco-endocrinology might be studied in this connexion as having a bearing on the manner in which drugs influence the functional activity of the ductless glands. If, therefore, with some drug one could enhance the action of the adrenals one could, at will, increase not only respiratory activity but also tissue metabolism, the foundation of all functions. Strychnine he considered the most active suprarenal stimulant. Others existed, such as cocaine in small doses, and digitalis and quebracho were partial excitants of adrenal activity, caffeine, tea, and coffee also possessing this power when used in moderation. Having discussed adrenal stimulation, Dr. Sajous turned to the question of how to control excessive activity of the adrenals. Various disorders, sexual, muscular, and cutaneous, were traceable to hyperadrenia. This caused in some cases a pseudo-type of high blood pressure, due to excessive constriction of all arterioles, thus producing arterio-sclerosis. The antagonists to this hyperfunction of the adrenals were the nitrites. Persistent hyperadrenia was the cause of the high blood pressure in those cases termed pseudo-angina pectoris, and nitrites combined with dietetic regulation rapidly removed this disorder.

Another potent resource at the disposal of therapeutics was the thyroid gland, with its influence on the katabolic phase of metabolism in the breaking down of fats and soft tissues. A further function preeminently attributable to the thyroid was its immunological activity, so active at times that it destroyed not only bacteria and their toxins but the tissues themselves. The over-active thyroid was indeed capable of destroying both body and mind. Dr. Sajous stated that in dementia præcox the phosphorised cerebral cell fats had been katabolised by the thyroid hormone secreted to destroy the pathogenic agent, usually of intestinal origin. In hypothyroidism, on the other hand, the patient was highly sensitive to infections and succumbed promptly thereto unless protected by thyroid therapy.

The influence of drugs on the thyroid gland, Dr. Sajous concluded, would have to be studied in regard to the body's defensive functions. The iodides, by stimulating the activity of the thyroid gland, added to the body's antitoxic and bactericidal functions. Besides the iodides, calomel, in very small doses—not more than 1/12 gr.—was a powerful defensive agent. Given in these quantities calomel, by its thyro-activation, had been effective in checking epidemics of diphtheria, probably by increasing the flow of antibodies in the blood. Such examples sufficed to illustrate the resources of pharmaco-endocrinology. Excitants of the ductless glands could be used to abort disease by stimulating antibodies, and depressants of these organs could be used to check exuberant activities which destroyed both mind and body. Organo-therapy indicated the influence of endocrines upon morbid processes; and pharmaco-endocrine therapy revealed their true importance as weapons against disease.

Dr. Sajous has himself made important contributions to the subject of which he writes, and his views demand attention. In an appeal for the endowment of a Chair of Pharmacology at St. Mary's Hospital Medical School, it is pointed out that there is only one complete pharmacological institute in London, and even this is dissociated from any hospital. The neglect of the systematic study in this country of the therapeutics of the endocrines by recognised pharmacological methods is probably also in large degree due to the difficulties of standardisation. When these have been surmounted—and the matter is under the present consideration of a committee appointed[1] last May by the Minister of Health—the study of endocrinology may be expected to attract fresh attention and important results may ensue.

INFLUENZAL MASTOIDITIS.

THROUGHOUT last winter and spring, but especially during the spring months, there occurred an abnormal number of cases of acute otitis media in which the sequence of nasopharyngeal infection and infection of the middle ear has been obscure or so foreshortened in time that the otitis has been the first observed occurrence. The extreme virulence of the otitis has been remarkable in many of these cases, so that some of them have appeared septicæmic almost from the first hour, and nearly all have shown a quite abnormal degree of intoxication. Where a definite catarrh has been present it has been of that febrile type which constitutes, when epidemic, an "influenza." The bacteriology of the middle-ear process is streptococcal. A precocious involvement of the mastoid has been common, and has often been discovered before there were any evidences of mastoid infection clinically, the case being explored simply on the strength of the patient's very grave general condition and the otitis. It has been remarked in addition that where the initial stages of the otitis were got through without mastoid exploration there has still been an unusual proportion of cases in which the continuous presence of profuse discharge, often without any other sign, has led to the exploration of the mastoid and the discovery of extensive infection and pus formation. In our issue of July 31st (p. 241) Mr. F. F. Muecke and Dr. C. Grantham-Hill described a number of these milder cases of symptomless "influenzal mastoiditis." The absence of obvious signs of mastoid suppuration, leading in many cases to delay of operative treatment, has, however, occasioned a quite unusual proportion of the graver intracranial complications. A recurrence of otitis media of this severe type is probable during the coming winter months, and it will be necessary to keep the matter in mind if the occurrence of unnecessary catastrophes is to be avoided. The indications for operation, judging by last year's experience, should be, firstly, the presence of grave general intoxication in any case of acute otitis media; second, the persistence of profuse discharge even without any obvious malaise and in the absence even of any mastoid tenderness or periosteal thickening. In nearly all such cases a valuable indication of suppuration in the antrum will be found in the swelling of the periosteum and integument of the deepest part of the postero-superior part of the wall of the bony external meatus. Where this condition is present the mastoid should be opened without delay.

[1] THE LANCET, 1920, i., 974.

GASTRIC POLYPOSIS.

ACCORDING to Dr. Ernest S. Du Bray,[1] of the University of California, who reports an illustrative case, confirmed cases of gastric polyposis are comparatively uncommon. He suggests that some of the vague and obscure conditions of the stomach which have been diagnosed as chronic gastritis or gastric neurosis may, on further investigation, prove to be examples of benign tumours of the gastric wall. The term "gastric polyposis" includes adenomas, fibromas, lipomas, and papillomas, which may all form polypoid tumours, in which sometimes the connective tissue predominates and at other times the glandular elements. The most important primary benign tumours of the stomach are polyadenoma and papilloma, the others being extremely rare. Nothing definite is known about the cause of gastric polyposis, but it is frequently associated with other diseases, such as gastritis, hypertensive cardio-vascular disease, and syphilis. It is commonest in men past middle age. There are no pathognomonic symptoms, although there are sometimes suggestive evidences of the disease. Clinical manifestations depend principally on the size, position, and nature of the growth, and especially on its relation to the pyloric end of the stomach. Non-pedunculated masses on the greater curvature may remain latent or more commonly produce vague epigastric symptoms, followed by a desire to belch and eventually to vomit. The symptoms do not appear to have any relation to meals. The vomit contains an excessive amount of mucus, in which, as in Meyer's case, a polyp may sometimes be found and enable a pre-operative diagnosis to be made. There is usually achylia gastrica or hypo-acidity. Pedunculated and less commonly non-pedunculated growths near the pylorus may prolapse and give rise to partial or complete pyloric obstruction. Hæmorrhage due to the great vascularity of the tumours is frequent, but remains long unrecognised. Occult blood will be found in the fasting contents of the stomach and in the stools. The general nutrition, weight, and blood picture are less affected, as a rule, than in

[1] Archives of Internal Medicine, August 15th, 1920.

carcinoma. Generally speaking, palpable masses are commoner in those cases in which the growth is large. Long duration of the symptoms with little or no change in the patient's general health is strong evidence against the presence of malignant disease and should suggest the possibility of a benign tumour. Dr. Du Bray's case occurred in a man, aged 48, who had a history of epigastric pain and belching with loss of weight of six months' duration. Apart from epigastric tenderness, physical signs were negative. The absence of free hydrochloric acid in the gastric juice and the presence of occult blood in the stools, together with the fluoroscopic picture, which showed a large, clear-cut defect in the greater curvature, suggested a diagnosis of gastric carcinoma. Exploratory laparotomy revealed a broad-based papillomatous tumour in the greater curvature of the stomach. The tumour was excised, and the patient when seen six months later had had no recurrence of his symptoms.

THE PROPERTIES OF SERPENT VENOM.

WE have in the *Tropical Diseases Bulletin*, issued under the direction of the honorary managing committee of the Tropical Diseases Bureau, a useful and practical Centralblatt in a branch of medicine of steadily growing importance. The August number of the *Bulletin* contains a review of a series of papers recording the results of exhaustive investigations on the properties of serpent venoms. The details were published by B. A. Houssay, J. Negrette, and A. Sordelli in the Review of the Institute of Bacteriology (Buenos Aires), and deal chiefly with American species of serpents, while including also Australian, Asian, and one European species. The action on carbohydrates, fats, and lecithin of certain venoms was first investigated. These venoms are summarised as having no amylolytic action and as being almost inert, with one exception, against neutral fats, but as saponifying lecithin with evidence of a strong hæmolytic power. This ability to split lecithin is favoured by salts of calcium and by normal serum, and may either be thermolabile, or thermostable to a varying extent. These venoms also curdle milk; their properties are lost by filtration, by agitation with animal charcoal, and by heating (70° C.), and slightly impaired by horse-serum. Though the respective antivenines are specific they are to a certain extent congeneric. The varying action on proteins of the same venoms is then discussed. The proteolytic action is much weaker than that of trypsin, and is not exercised on solid proteins, except on fibrin in the presence of salt water. The proteolytic venoms generally retard coagulation by heating; they alter and then hydrolyse the proteins of serum, change dissolved casein so that it is no longer precipitated by acetic acid, and liquefy gelatin. The proteolytic property is distinct from the coagulant, agglutinative, toxic, and hæmolytic properties. The special diastatic properties of various organs and tissues of *Lachesis alternatus* have been investigated in detail and a certain amount of lecithinasic (or fat-splitting) and amylolytic action has been discovered in most of them; the pancreas and liver alone show a weak inversive power and a weak lipolytic action on oil. No proteolytic action could be demonstrated in these tissues. The venoms of two Australian species, *Pseudechis porphyriacus* and *Notechis scutatus*, and two Indian species, the cobra and Russell's viper, have no amylolytic action, but a lecithinasic action which was at first diminished, then augmented, and finally attenuated on heating progressively from 50° to 100° C. Cobra venom has some slight action on olive oil, and curdles milk and liquefies gelatin very feebly. The venom of Russell's viper also curdles milk feebly. Strong doses of cobra venom favour heat-clot of normal horse-serum, and watery solutions of horse-serum and of the red corpuscles of the horse are precipitated by concentrated solutions of cobra venom. As regards the specific action of venoms upon the blood, of the 17 venoms tested 11 are described as coagulant and 6 as anticoagulant. Experiments in vitro show that the phase of coagulation influenced varies widely; for example, the proteolytic venoms act on fibrinogen and may render it incoagulable, while others impede the alteration of thrombin. The special phenomena of coagulant venoms in vitro, the effects of different physical and chemical conditions in modifying those phenomena, and the interaction of toxin and antitoxin have also been studied. The times of clotting have not been found to vary parallel with the quantities of venom. Excessive doses of these coagulant venoms prevent clotting by altering the fibrinogen, and it is thus necessary to experiment with progressive doses of venom. Salts, particularly oxalates, impede the clotting, as also does peptone. Mammalian plasma is more easily clotted than that of birds, reptiles, and batrachia. The clotting constituents of the venoms are filtered with difficulty, do not dialyse, resist alcohol, are precipitated by ammonium sulphate, and destroyed by potassium permanganate. Progressive heat either gradually diminishes the power of the venoms, or, more often, causes a sudden and marked diminution followed by recuperation. Antitoxic plasmas and serums are highly but not rigidly specific. There is not, so far as can be seen, any oppugnant principle between anticoagulant and coagulant venoms; the difference between them depends upon the action of the anticoagulant venoms upon fibrinogen. Experiments in vivo, most successful on the dog, show that in coagulant venoms the clotting is directly due to precipitation of fibrinogen by the venom itself. This "positive phase" is succeeded by a "negative phase" in which, as a consequence of the complete precipitation of fibrinogen, and not because of any formation of antithrombin, the blood is incoagulable. The anticoagulant venoms must be injected in large doses to produce their characteristic effect, which is due, not to precipitation of fibrinogen—though fibrinogen is diminished—nor to any formation of antithrombin, but to direct destruction of thrombokinase.

MIKULICZ'S DISEASE.

WE published in THE LANCET of Sept. 4th a note by Dr. S. G. Askey on this rare condition, and on Sept. 11th a letter from Dr. Dan Mackenzie describing several cases of his own. We now draw attention to a very remarkable and interesting example of the same disease communicated[1] by Professor Nino Samaja which occurred in the Ospedale Maggiore. His case is of exceptional interest not only because all the salivary glands which are clinically observable were affected by the same morbid process, but also because the enormous increase in volume of the pharyngeal glands on the right side produced an occlusion of the Eustachian tube with unilateral deafness. Professor Samaja states that none of the throat and nose specialists to whom he referred the case had ever met with unilateral auditory disturbance due to this cause, associated with symmetrical hypertrophy of the salivary and lacrymal glands.

The patient was a man, 62 years of age, who had been extremely healthy until he began to experience tinnitus and deafness in the right ear. When he came under observation there was marked hypertrophy of the lacrymal, parotid, and submaxillary glands. On raising the tongue the two enlarged sublingual glands were seen, while the apical glands of Blandin-Nuhn could be palpated, and the palatine glands were visible when the mouth was widely opened. By palpation various other glands were felt to be enlarged, notably the epitrochlear, cervical, axillary, and inguinal (in the latter situation they were as large as a pigeon's egg), rather hard, not tender, and adherent neither to the skin nor subcutaneous tissue. Saliva was somewhat scanty, but other organs presented no abnormalities. Examination of the eyes showed bilateral pterygium and papillary hypertrophy of the conjunctivæ; the lacrymal ducts were pervious. Posterior rhinoscopy revealed that the rhino-pharyngeal space on the right side was occupied by a fleshy mass, pale pink in colour and of smooth contour. Wassermann's reaction was negative, and the blood count showed the relation between white and red cells to be 1 to 941, lymphocytes 26·5 per cent., large mononuclears 3·5 per cent., polynuclears 66 per cent., eosinophiles 1 per cent.—an almost normal proportion.

In Professor Samaja's case radiotherapy was followed by brilliant results: six applications were given with an aluminium filter of 3 mm., spark equivalent 25,

[1] Bullettino delle scienze mediche. 1920. Via Altabella 6, Bologna.

milliamperes ½, duration 20 minutes. Forty days after the last application most of the enlarged glands had disappeared and also the deafness and tinnitus. The effect on the blood count was that the relation between the white and red cells increased to 1 to 604, while at the same time a marked eosinophilia was produced. Professor Samaja distinguishes clinically pure forms of Mikulicz's disease (hypertrophy of the lacrymal and salivary glands without concomitant lesions of other systems) and forms associated either with general lesions of the lymphatic system (leukæmia, pseudo-leukæmia, lymphosarcomatosis, &c.) or with general infections, and he states that the prognosis is in direct relation to the general disease with which Mikulicz's syndrome is associated.

DISLOCATION OF THE CARPAL SCAPHOID.

IN the *Boston Medical and Surgical Journal* for August 26th Dr. William Pearce Coues has described a very rare injury. Dislocation of the carpal scaphoid alone, or associated with semilunar dislocation or fracture, is one of the rarest of injuries. Scaphoid dislocation, when it does occur, is usually the result of a fall from a height on the hyperextended hand. If the radius does not give way the force of the impact is transmitted to the os magnum through the dorsal corner of the semilunar, which brings pressure on the neck of the scaphoid, while the anterior part of the capsule fixes the bone at the centre. Ordinarily from this force a fracture through the neck of the scaphoid results.

A carpenter, aged 54 years, was examined for the Massachusetts Industrial Accident Board on April 7th, 1919. On Jan. 20th, while descending a ladder, he slipped and fell some 20 feet on a concrete floor. He was unconscious for some time after the accident, and was treated in hospital for three weeks. On examination a depressed fracture of the frontal bone and of the head of the right radius, with much new bone about the elbow-joint and practically no motion, were found. There was also inability to use the left wrist, with aching, stiffness, and general disability of the hand. Examination showed bony thickening about the wrist and the styloids practically on a level. There were only a few degrees of active motion at the wrist-joint in any direction, and attempts to increase this passively caused pain. The thumb and fingers were stiff, but he was just able to oppose the thumb to the index finger, although he could not flex the fingers into the palm. The grasp of the hand was weak, and rotation of the radius was restricted. On the palmar aspect of the wrist, just below the end of the radius, was a marked bony prominence. This was immovable and seemed to block the wrist motions almost completely. It corresponded in general level to the situation of the scaphoid. Radiography showed the lower end of the radius fractured and complete dislocation of the scaphoid, with some displacement of the semilunar. It seemed that operation would give the only chance of a useful wrist, but on account of the condition of the other arm the patient declined.

In connexion with this and allied injuries the experiments of Honigschmied are of interest. In 19 cadavers he forcibly extended the hand. In 17 fracture of the lower end of the radius resulted and in 2 rupture of the anterior ligament of the wrist with anterior dislocation of the semilunar. In 8 cases a preliminary dissection of the wrist was made before hyperextension. In 5 the palmar capsule was lacerated, and twice the scaphoid was partially dislocated, and once the ligament between the two rows of carpal bones was torn. It would seem that in the case of scaphoid dislocation from hyperextension intercarpal ligamentous rupture with lateral torsion of the wrist would best account for this unusual injury. The bone is probably suddenly squeezed out of its bed as one shoots the stone from a cherry, a mechanism graphically described by Eigenbrodt in explaining dislocation of the semilunar bone.

THE Harveian Oration will be delivered at the Royal College of Physicians of London by Sir Frederick Andrewes at 4 P.M. on Monday, Oct. 18th.

THE Italian Government have conferred the Italian silver medal Al Benemeriti della Salute Pubblica upon Dr. Leonard Hill, F.R.S.

PUBLIC HEALTH IN SOVIET RUSSIA.

BY L. HADEN GUEST, *M.C.*, M.R.C.S. ENG., L.C.C.,
SECRETARY AND PHYSICIAN TO THE BRITISH LABOUR DELEGATION.

IV.—GENERAL AND SOCIAL DISEASES.

THE difficulty of forming an accurate impression of health conditions in Soviet Russia is much increased beyond that usual in all countries by (1) absence of trustworthy statistics; (2) great variation in conditions from one part of Russia and Siberia to another; (3) disturbances due to revolution and to war.

Malnutrition and its Results.

With regard to general nutrition it has been already pointed out that the towns are half-starving. The industrial workers are many of them anæmic, underfed, some obviously very ill. But in the country districts conditions are better, and, speaking broadly, the peasants have enough to eat, although they may lack certain things, such as salt (Samara Province) or meat (in most provinces). Dr. Semasko described one province to us—that of Nijni-Novgorod—as a "starving province." But in Samara Province there was an abundance of eggs and milk—milk, in fact, was used for washing the hair in place of soap in a village visited by one of our number.

But I did not find it possible to get reliable statistics of births, deaths, and causes of death. It was said in Petrograd that the birth-rate was rising rapidly; on the whole, however, the birth-rate seems to be exceeded by the death-rate. Dr. Semasko stated that the birth-rate was going up, but had not reached the pre-war level. Infantile mortality is certainly high. The aged, too, have suffered severely, and the age at death is falling owing to the severity of the conditions of life.

Diseases of children have not markedly increased, but children are below their proper level of development. Rickets was estimated at 80 per cent. of the child population, but I did not see the severe types of case which were common in Vienna in 1919.

Scurvy has doubled its large pre-war figure, and I saw many cases in hospital at Saratov. I was told at Astrakhan that there were 642 cases in hospital then (June 7th), and that 900 cases had been evacuated to Saratov in May, 1920. There has also been a great increase in cases of night-blindness (attributed to shortage of fat), and a great increase in anæmia showing itself in women in a marked diminution of menstruation. *Tuberculosis* has increased very much in the towns, but not apparently more than in Central Europe generally. The Soviet authorities are attempting to increase the hospital accommodation and also the number of the tuberculosis dispensaries, and claimed to have large numbers of beds available. An actual instance at Astrakhan, however, shows the fallacy of mere paper plans and figures. At this place a new Soviet hospital for 750 infectious cases was "decreed." A hospital was brought into being, but it contained only 70 beds and was not properly equipped. It is claimed that since the Soviet Government assumed power there has been an increase of 40 per cent. of permanent beds available for civilians (excluding infectious cases). One of these newly established hospitals, installed in the palace of the ex-Governor at Saratov, was inspected; it was crowded and badly equipped, and although in a splendid building, produced an effect of dirt, deprivation, and poverty. The work of all these hospitals goes on under great difficulties owing to the absence of dressings, drugs, linen, and even of the necessary food. The milk required for hospital cases cannot be obtained in sufficient quantity, practically nothing in the way of an "invalid dietary" exists, while ordinary food, including black bread, is short.

Health of School Children.

No definite statistics are available with regard to the health of school children, as there is no system of medical inspection as in this country. From my own observations I should judge the conditions of school

THE MEMBERS OF THE BRITISH LABOUR DELEGATION TO RUSSIA.

From left to right (standing): Dr. Haden Guest (secretary of the delegation); Mr. A. A. Purcell (Woodworkers); Mr. Robert Williams (Transport Workers); Mr. C. R. Buxton (interpreter and secretary); Mr. H. Skinner (Printers).
From left to right (sitting): Mr. Ben Turner (Textiles); Mr. Tom Shaw, M.P. (Textiles); Mr. R. C. Wallhead (Chairman, I.L.P.).
In foreground: Mr. Clifford Allen (I.L.P.).

children to be much on a par with those existing in the poorer parts of England, with a very great increase in the number of cases suffering from vermin and an increase in certain other ways, noticeably in tuberculosis and in some places of syphilis. A number of institutions for treatment of children have been started in the towns and scattered in the provinces, including special sanatoriums for tubercular and pre-tubercular children and dental clinics. Dr. Semasko told me that children were being born weak, were developing badly, and had much tuberculosis and rickets. Also that the proportion of stillbirths had increased.

Syphilis and Preventive Measures.

Syphilis was stated to be very extensively distributed in Russia. Prostitution, of the old type at any rate, is rapidly dying out and the old prostitutes are being taught to work, but there is still very much venereal disease. Some figures were given me for Petrograd, Olonetz, and Novgorodski Governments for the years 1911–15, as follows:—Cases per 10,000 of the population: Petrograd, 156·1; Olonetz, 123·3; Novgorodski, 92·4. When I quoted a statement made by a Red Cross representative in Switzerland to the effect that 80 per cent. of the population of certain Southern Russian and Ukrainian villages were infected with syphilis, Dr. Semasko agreed that this was a reasonable estimate. As there is a practical absence of any drugs for treating the disease, the spread of syphilis is presumably going on at a rapid rate. The Soviet Government state that between January, 1919, and May, 1920, they opened 3363 beds for syphilis, with 29 special out-patient clinics and 11 laboratories for carrying out Wassermann reaction. I inspected one of the out-patient clinics in Moscow. It was a newly established, practically unused place, with an adequate supply of instruments and furniture and a small supply of salvarsan and allied preparations. In addition to this treatment work the Bolsheviks carry out a propaganda by poster and by leaflet of a convincingly frank description. In Moscow I went over a sanitary exhibition in which were new models of men and women affected with syphilis, the rashes and sores being very well shown. A doctor was on duty in the exhibition to show people round, but there was only one person besides myself going the rounds when I was there. The models were very good, and horrible enough to scare anyone into a very reflective state of mind.

Alcohol Scanty.

It is well known that during the war the Czar prohibited the distribution of alcohol. The Bolsheviks, on taking over power from the Kerensky Government, have maintained this prohibition. Alcohol is said to be more disastrous in its effects on Russians than on Western Europeans. Very strenuous measures are taken against the use of alcohol. In the railway service, for instance, an employee who obtains alcohol illicitly and gets drunk is shot "without mercy," as the high officer who was my informant told me. At the time of the Bolshevik revolution very large quantities of alcohol were deliberately destroyed by the Bolsheviks, an officer who superintended this at one place telling me how he stood over the men doing the work with a revolver in his hand and tested each man on his leaving work by smelling his breath. A certain amount of alcohol is still in the country and can be obtained for medical purposes or by the especially privileged. I was

able to get six bottles of champagne, one bottle of old brandy, and three bottles of red Caucasian wine for use of sick. Other small quantities of alcohol were get-at-able in other ways, but generally speaking it is a matter of great difficulty to get wine or any kind of alcohol in Russia. And no doubt the absence of alcohol makes it easier for the Government to control the population. Now, however, the peasants are beginning to want a little wine.

As an example of the difficulties in the way of observation caused by the political disturbances may be mentioned the case of the Ukraine. It appears that ordered Government in that country simply does not exist over large areas. The Government recognised in one town may be repudiated in another only a few miles distant. Much of the country is under the control neither of the "Red" forces nor of their "White" antagonists, but of the "Greens," who are frequently mere plundering bands wielding the authority of bandit chieftains over big areas. There have been in the Ukraine since the revolution at least 16 different Governments. The conditions in that country are not better as regards infections (including syphilis) than Russia, but there is some evidence that considerable areas are more prosperous as regards the food of their own populations.

Reduction of Vitality.

What does emerge from this general survey of conditions is the universal distribution of dangerous infections, the lack of medical supplies, and in particular of soap and disinfectants, and the generally reduced vitality of the population, more especially of the town population. Civilised life is falling to pieces in Russia; the towns are more stricken than the country, and while power is in the hands of a small group of people in the towns, the support of this power is, in fact, very largely in the country population, who supply the armies and who feed the whole population. The danger that these conditions may lead to mere anarchy is obvious, and the existence of many millions of men and women infected with the most dangerous diseases known to exist in immediate proximity to Western Europe is a nightmare conception which should stir Europe to help Russia, even if motives of mere humanity do not.

There is no question of imposing another Government on Russia from without. That is a futile delusion of incompetent interventionists like Denikin and Kolchak. The decay of a whole civilisation must be arrested by many measures of help and assistance, which it is beyond the scope of these articles to deal with, but one of the most important is the provision of such medical assistance as shall give the Russian doctors the necessary drugs, soap, and disinfectants they need not only to save their own people, but to preserve Europe from the danger of virulent, widespread, and recurring epidemics of disease.

THE COLONIAL MEDICAL SERVICES:

REPORT OF THE DEPARTMENTAL COMMITTEE.

BRIEF reference was made in THE LANCET of Sept. 18th (p. 626) to the Report of the Departmental Committee appointed to inquire into the Colonial Medical Services.[1] The terms of reference were as follows:—

1. To consider generally the position of the medical service of the various colonies and dependencies for which the personnel is now provided by the Secretary of State, with a view to maintaining and increasing the supply of candidates for appointment as medical officer and to securing contentment within the service.
2. To consider whether the principle of assimilating the medical service in neighbouring colonies, as already adopted in West Africa, may usefully be extended, and, if so, how far and by what means.

The Committee decided to hear evidence from witnesses competent to express the views of the medical staffs of the various groups of colonies to which appointments are made by the Secretary of State, and also from others acquainted with the conditions of the Colonial Medical Services.

A Unified Service.

In the opinion of the Committee the ideal is a unified service, the personnel of which would be recruited from men who had recently become qualified to practise and would be liable for service in any of the various colonies to which appointments are made by the Secretary of State. They realise, however, that the full attainment of this ideal is not possible at present, and in the various recommendations which they have made in this report they have kept this fact constantly in view and have confined themselves to such measures as are practicable, and would yet go far to meet the legitimate desires and grievances of the various services.

The Report sets out briefly the difficulties which appear to stand in the way of recommending the creation under present conditions of a unified service. These may be summarised as follows:—

(*a*) Members of a unified service must be servants of one Government and paid from the Imperial Treasury, while each colony is a separate Government paying its own medical officers with funds usually derived from local taxation.
(*b*) In some colonies the selection of candidates is made by the Secretary of State, whereas in others only the senior officers are so appointed, the junior officers being recruited locally and appointed by the Governor.
(*c*) There is a wide divergence between the salaries paid on first appointment in the various colonies.
(*d*) Racial difficulties obtain in some colonies to a greater extent than in others.
(*e*) The regulations as to private practice and the opportunities for such practice differ very widely.
(*f*) In most services the appointments are pensionable, but in a few they are not. Moreover, pension scales are not uniform.
(*g*) The regulations as to leave and passage differ widely in the various colonies.
(*h*) In many colonies knowledge of one or more local languages is very desirable.

If the recommendations of the Committee should be carried into effect they are of opinion that after a period of, say, five years, the experience gained should be reviewed by another Committee, in order that, if justified, further steps may be taken towards the formation of a still more unified service.

The Unification of the Colonial Medical Services.

Hitherto a candidate has applied for a medical appointment in a special colony or group of colonies. The Committee recommend that in future the application should be made for admission to "The Colonial Medical Service." The Report states briefly the nature of the following advantages likely to attend the creation of a unified Colonial Medical Service:—

(*a*) It would constitute a recognition of the Colonial Medical Service as a distinct branch of the public medical service of the Empire.
(*b*) The status of the Service in the opinion of the medical profession would be enhanced.
(*c*) The young medical man when asked, as he often is, "What are you going in for?" would be provided with a brief reply, carrying a definite meaning—viz., "The Colonial Medical Service."
(*d*) The above considerations would tend to encourage recruiting.
(*e*) Questions at issue affecting the interests of a unit of the Colonial Medical Service would be settled with much less display of feeling if those concerned knew that they had been submitted to a man of standing in their own profession.
(*f*) Possibly the most immediate and obvious advantage would be that throughout the Service it would be regarded as an attempt to provide them "with an adequate channel through which to express any feelings of discontent which may arise at any time."

The Head of the Colonial Medical Service.

The Committee are of opinion that an officer of standing in the medical profession, whose opinion would have weight with the Secretary of State, and whose name would create confidence in the medical profession, should be appointed a member of the Colonial Office staff, with a title commensurate with the importance of his position. The majority of the Committee recommend that he should be given the title of Director-General of the Colonial Medical Service. His duties may be set out as follows:—

(*a*) Generally he should advise the Secretary of State and the permanent staff of the Colonial Office on all questions relating to the personnel of the Colonial Medical Service as distinct from questions of medical and sanitary theory and practice.
(*b*) He should be accessible to all officers of the Colonial Medical Service who might wish to see him when they are at home on leave.
(*c*) He should advise on all changes in the regulations and conditions of employment of medical officers.
(*d*) He should assist in the interviewing of candidates and of possible candidates for appointment in the Colonial Medical Service.
(*e*) He should be a member of the subcommittee on colonial medical appointments if the present method of entering the service is continued. If it is not, he should be a member of whatever committee may be appointed to interview candidates for medical appointments before their admission to any examination that it may be decided to hold.
(*f*) He should keep in touch with the medical schools in the United Kingdom.

[1] Colonial Office: Report of the Departmental Committee to inquire into the Colonial Medical Services. Together with a letter from the Colonial Office to the Chairman of the Committee. London: His Majesty's Stationery Office, 1920.

(*g*) He should be a member of the Advisory Medical and Sanitary Committee for Tropical Africa when questions of promotion are under consideration by that Committee, and also of the Promotions Committee of the Colonial Office in connexion with the fitness of officers for transfer and promotion in other units of the Colonial Medical Service. For this purpose he would have access to the confidential reports on officers of the Colonial Medical Service.

(*h*) He should endeavour to keep in touch with the feeling of the Service and to bring the existence of causes of discontent to the notice of the Colonial Office.

(*i*) He should be concerned in the preparation of and annual revision of a Colonial Medical Service List, to which reference is made below.

(*j*) Should it be decided to adopt the examination system as the method of entry into the Colonial Medical Service, all proposals relating to such examination and its details and conditions generally should be arranged in consultation with him.

Nursing sisters.—No reference is made to the question of the recruitment of nursing sisters. Nursing sisters and nurses are recruited by the Overseas Nursing Association, and there is no reason to doubt that the present arrangement is satisfactory, having regard to the terms offered by the various Colonial Governments. It would probably be desirable that the officer in question should be associated with the Overseas Nursing Association; he might perhaps represent the Colonial Office on the Committee, or be associated with the member of the Colonial Office staff who now sits on the Committee.

Matters outside the scope of the Director-General.—The regulation of the discipline of individual members of the Service whilst serving under Colonial Governments would remain with the Governor and Principal Medical Officer of the colony concerned.

Personnel of the Service.

In the opinion of the Committee it is most desirable that in future the attempt should be made to attract to the Service the best type of young men fresh from the medical schools. Stress should be laid on the importance of recently qualified men being seconded for a resident appointment, such as house physician or house surgeon, preferably at the hospital where they have received their education in the practical subjects of their profession, and failing that, at some other hospital not attached to a medical school, but approved for the purpose by the Secretary of State. The adoption by the army authorities of this system has been successful, and is advantageous alike to the individual and to the Service of which he has become a member.

Method of admission to the Service.—The Committee have considered carefully the proposal that admission to the Service should in future be by competitive or qualifying examination in place of the present method of classification by the Medical Appointments Subcommittee, and have come to the conclusion that the former method presents distinct advantages if, as they have already suggested, the personnel is to be recruited from amongst the men who have recently passed through the schools.

The Committee find that while on several minor points the Colonial Medical Service might be made more attractive the chief and only really important cause of the difficulty in adequately filling vacancies, apart from the scarcity of medical men during the war, is that the improvements in salary and pension prospects in the different colonies have not kept pace with increased rates of emoluments in other classes of medical employment and in private practice or with the increased cost of living.

It might, in the opinion of the Committee, be an advantage if the heads of the medical departments of the public services—viz., the Navy, the Army, India, and the Royal Air Force—could agree to hold a single entrance examination, as is done by the Civil Service Commissioners for the various offices of the Civil Service. Should such an examination be instituted the Committee recommend that the Colonial Medical Service should fall into line with the other departments concerned. Candidates should be interviewed and approved before examination.

The number of medical appointments in the colonies with which the Secretary of State is concerned is about 600. Assuming that the principle of admission to the Service by examination is accepted it would, in the opinion of the Committee, be necessary for the Secretary of State to reserve the right of appointment by selection to certain posts of a special character for which the method of admission by examination is unsuited. This would also apply to admission to certain new departments of the Service, to which reference is made at a later stage of the Report.

Organisation of the Colonial Medical Service.

As a completely unified Service is not at present possible, it would be necessary for candidates to offer themselves for service in those colonies for which they were eligible according to the regulations then in force. The Colonial Office is at present organised in geographical departments, each dealing with the affairs of one or more colonies or groups of colonies. These departments are: (1) Ceylon and Mauritius; (2) Far Eastern; (3) Nigerian; (4) Gold Coast and Mediterranean; (5) East African; (6) Tanganyika and Somaliland; (7) West Indian. The affairs of Fiji, the Western Pacific High Commission, and the South African Protectorates are dealt with by the Dominions Department.

The Committee recommend that the Colonial Medical Service should be organised in the same manner and that candidates should apply for admission to the Service in one or more of those departments.

Assimilation of the Medical Services in Neighbouring Colonies.

The Report discusses in some detail the possibility of forming into separate units the medical services of neighbouring colonies. The medical services of the West African Colonies have already been assimilated and formed into the West African Medical Staff. The Committee have carefully considered the conditions prevailing in the different groups of tropical colonies, and find that the only other medical services that can with advantage be assimilated are those of: (*a*) The Straits Settlements and the Federated and Unfederated Malay States; (*b*) the East African Protectorates and the Tanganyika Territory. The Committee understand that transfers freely take place among officers in group (*a*), and that such transfers involve no loss of leave or pension.

The assimilation of the medical staffs of the four West African Colonies has been a conspicuous success. The Committee strongly recommend that a similar staff be formed for the East African Administrations, and that, as far as possible, the conditions of service, pay, pension, and gratuity be assimilated to those existing in the West African Medical Staff so as to facilitate the ultimate combination of the two services into one medical staff for British Tropical Africa.

Inspectors of Medical Services for West and East Africa.

Emphasis has been laid by several of the witnesses who appeared before the Committee on the desirability of frequent and regular inspection of the individual stations and the Colonial Medical Service generally by some medical man of senior standing, in the interests, not only of the public, but of the medical officers themselves. The Committee regard as a matter of urgency the appointment of officers charged with these duties for West and East Africa, who might be styled "Inspectors of Medical Services," so long as it is understood that "medical" includes the duties now classed as "sanitary." Officers whose duty it is to inspect regularly, in one case the West African Colonies and in the other the East African Protectorates and the Tanganyika Territory, will find plenty of work to occupy them for some six or eight months in the year. For other parts of the empire a system of occasional visits as opportunity serves, or some local emergency demands, by medical men of authority on tropical questions, seems to be all that is required at present.

Pay, Pensions, and General Conditions.

The Committee remark that salaries are at present low and that the cost of living is increasing, and note the necessity for increased pay. They are of opinion that it will be necessary for the Colonial Medical Service to offer an initial salary of at least £600 per annum for whole-time appointments. In many cases in pre-war times the salaries were wholly inadequate. The increased cost of living presses with double hardship upon officers serving in tropical and sub-tropical colonies who have to maintain out of a fixed income, not only themselves, but also their wives and families in this country.

Pensions and scales of pension.—The Committee understand that the question of the age of voluntary retirement and of rates of pension is under consideration, and, in the circumstances, they refrain from making any specific recommendations, but venture to express the hope that the claims of the medical officers will be considered in a generous spirit.

Gratuity on retirement after nine years' service.—The Committee recommend that the gratuity now given to officers in the W.A.M.S. who desire to retire after nine years' service should be continued and increased to £1500, notwithstanding the fact that few men have availed themselves of it. They also recommend that the gratuity payable after 12 years' service should be increased to £1875, and that similar gratuities should be instituted in the E.A.M.S., or even made general throughout the Colonial Medical Service.

Leave and passage.—The Committee have received but few complaints that the leave granted by the regulations is inadequate in point of duration, but several that the sum allowed for the payment of the passage home does not cover the cost of the journey, particularly when it is necessary to change steamers and remain at intermediate places awaiting the arrival of another boat. Several witnesses have complained that they did not get the local leave of 14 days or more in each year to which they were entitled. From the point of view of health and efficiency, it has been shown that, under certain conditions, relaxation is a necessity for the worker and an economy to the employer. Hence, it would appear to follow that the colony in which the officer has been serving should be responsible for his pay whilst on leave, and that the period of leave earned should be on full pay. The Committee consider that the regulation as regards passages

in force in the Straits Settlements—viz., that an officer returning home on leave is granted a free passage both ways for himself and his wife, and children up to the number of two—is equitable and deserving of general or modified adoption. Officers transferred from one colony to another and returning home before taking up the new appointment should receive free passages for the complete journey, whatever may be the salary of the new appointment.

Provision for widows and orphans.—The Committee understand that a scheme on the lines of that of the West African Colonies and Protectorates for making provision for widows and orphans of officers serving in the East African Protectorates is under consideration. They have received evidence in favour of this proposal, and express the hope that it will be possible to go further in this direction so as to include such European officers as are not now entitled to contribute to any existing fund.

Study leave.—The necessity for study leave, if a medical officer serving in the colonies is to keep abreast of the advance in medical science, has been recognised for some years, but the rapid changes taking place at the present date, particularly in the methods employed for accurate diagnosis, render study leave more than ever necessary. If the period of service to be followed by study leave is to be fixed, the Committee are disposed to put it at five years, and the duration of such study at not less than three months. Every officer should, in their opinion, be required to undergo a second course at the end of a further period of five years, and if an examination is held at the termination of the course to present himself for it. They do not think it is advisable to require that he should in either case pass the examination, but in considering his claims for promotion the fact that he has or has not passed the examination should be taken into consideration. It may be pointed out that the facilities for graduate study in London have since the war been greatly increased. Study leave should be on full pay, and the fees should be paid by the Government.

Specialist appointments.—It is now possible in the army for a man to attain to the highest rank and pay whilst continuing to practise the branch of the profession to which he has devoted his life. The Committee are strongly impressed with the desirability of introducing this principle, wherever possible, into the Colonial Medical Service. The presence on the staff of the larger hospitals in the more important colonies of a very able physician, surgeon, and gynæcologist and of specialists in these departments which are everywhere recognised—not omitting the head of the clinical laboratory—is of advantage not only to the patients under their care but to the whole of the medical men whose practice brings them into contact with that hospital. It is not, indeed, an exaggeration to state that the standard of clinical work throughout a colony may be raised by the existence of such a hospital staff. The Committee recommend that specialist appointments should be created and given to officers of the Service who have shown capacity in some recognised branch of medical science or practice, and who desire to continue their particular work.

Promotion.—It has been suggested that the increase of pay by annual increment is an evil, as tending to remove any incentive to effort; but the Committee are not disposed to adopt that view, and no evidence has been brought before them showing that it has had such an effect in the medical services of the colonies.

Designations.—The majority of the Committee recommend that the Colonial Governments should be urged to adopt a nomenclature which would be general throughout the Colonial Medical Service. The head of the medical department in each colony would be called "The Director of Medical Services" (D.M.S.). The next in rank, who would act for him in his absence, would be the "Deputy Director of Medical Services" (D.D.M.S.). According to the extent of the colony, the areas of administration, and the number of medical stations to be visited there would be one or more officers with the title of "Assistant Director of Medical Services" (A.D.M.S.). Then would come Senior Medical Officers (S.M.O.) and Medical Officers (M.O.).

Transfers.—The Committee are of opinion that, alike in the interest of the officers and of the Service, it is desirable to facilitate these interchanges, as they would tend to increase the attractions of the Service and bring into a colony new men with new ideas and a wider experience. They recommend that transfers should not be allowed to affect adversely the ultimate pensions of the officers transferred.

Housing.—The Committee have received a good deal of evidence showing that the housing conditions are very defective in many colonies, and that this is one of the causes of discontent. They recommend that the attention of the local Governments be called to this point.

Confidential reports.—Discontent has been expressed at the system hitherto in force under which the individual officer is not acquainted with the nature of the reports on himself. The Committee understand, however, that it has recently been decided to introduce important modifications into this system, which they believe should go far to remove the objections felt by officers.

Posting to stations.—It is very desirable that a medical officer, on his arrival for the first tour of duty in any colony, should serve for at least a month at the headquarters of the colony, and be attached for duty to the chief hospital, and at the same time learn the routine of administration.

Reference libraries.—The Committee recommend the provision of at least one medical reference library in each colony, and that a paragraph dealing with such libraries should always be included in the annual medical report of each colony.

Auxiliary medical service.—The evidence given leads the Committee to the conclusion that there is room in the West African Colonies for an auxiliary medical service on the lines of that of India or Ceylon. Before such a service could be created it would be necessary to found a medical school. As such a scheme would take some years to mature—i.e., before the first native obtained the licence of the college to practise—it should, if approved, be taken in hand as early as possible. Assuming that the personal material exists from which such a staff could be recruited, it would go some way towards meeting the legitimate desire of the natives to obtain a larger share in the civil service of their country.

Research.—There is no better investment for the money of any colony than scientific research, both medical and economic, and the Committee recommend the creation of such a department as part of the Colonial Medical Service. Any medical officer who may show a capacity for research work should receive every possible encouragement, and such officers in charge of clinical laboratories as give evidence of such capacity should be promoted to the research service, but appointment by special selection should not be excluded. The Committee recommend that a Medical Research Institute under a director should be established in every important colony or group of colonies, and that wherever possible the institute should be placed near to the largest and best-equipped hospital, so that the two institutions may mutually influence each other's standard of work.

Precedence and honours.—In West Africa the heads of the medical departments have been placed on the executive councils, either *ex officio* or personally, and in view of the increasing importance attached to medical and health questions, especially in the tropics, the Committee would be glad to think that this change was likely to become general. The question of the grant of honours by the Sovereign to the medical departments is a more delicate matter, and one on which the Committee hesitate to offer an opinion. They notice, however, that only three present members of the Colonial Medical Services have been the recipients of the C.M.G. for services rendered under the Colonial Office.

The Colonial Medical Service List.—The Committee were impressed with the fact that in the past the existence of the Colonial Medical Service has been almost unknown to the bulk of the medical profession. They state that in their opinion there should be, in addition to the institution of an entrance examination, a Colonial Medical Service List, giving full information as to the conditions of service under the various Colonial Governments and the names, qualifications, and services of the officers in each unit of the Colonial Medical Service. The names and services of the locally appointed officers should also appear in this list.

In conclusion, the Committee express their belief that by the adoption of their recommendations the causes of discontent which have existed in the Service in the past will be removed, and that the Colonial Medical Service will attain to a very high, possibly even to the highest, status amongst the public medical services of the empire.

Progress Already Claimed.

An appendix contains the names of those who gave oral evidence before the Committee. There is also appended a letter from the Colonial Office to the chairman of the Committee, in which considerable progress is claimed in the direction desired by the Committee. These instances are cited:—

1. The unification of the East African Medical Services has already been accomplished in everything but name, as uniform scales of pay have been introduced in all the administrations concerned, and there are uniform regulations as to pension, leave, &c., while the principle of promotion from one Dependency to another in East Africa is recognised.
2. The salaries of the West African Medical Staff have been completely revised, and an initial salary has been adopted in excess of the minimum of £600 a year recommended by the Committee.
3. Considerable progress is being made in the improvement of facilities for research in the colonies; in the case of the Gold Coast, for example, provision is being made for the creation of a special research department, with a staff consisting of a director and six pathologists.

The Report is signed by the following, who constituted the Committee: Sir Walter Egerton, K.C.M.G. (chairman); Sir Harry Verney, Bart., D.S.O.; Sir Humphry D. Rolleston, K.C.B., M.D., F.R.C.P.; Major-General Sir W. B. Leishman, K.C.M.G., C.B., M.B., F.R.C.P.; Lieut.-Colonel Sir James K. Fowler, K.C.V.O., C.M.G., M.D.; Mr. T. Hood, C.M.G., M.R.C.S., L.R.C.P.; Mr. A. Fiddian; with Mr. J. E. W. Flood as secretary.

HYGIENE ON THE SEA:

ACCOMMODATION FOR SEAMEN IN SHIPS OF TO-DAY.[1]

(BY OUR SPECIAL CORRESPONDENT.)

II. THE "OLYMPIC."

THE *Olympic*, of the White Star Line, had an honourable history in the war. She went at great risk to help H.M.S. *Audacious* when that ship was mined; she carried myriads of United States troops to Europe; she ran down and sank a German submarine; and she is the biggest ship built in England, so it was with very particular interest the other day, at Southampton, one went aboard her, reconditioned as she is and sumptuously equipped to make the week's voyage across the Atlantic as free as possible from the traditional hardships of the sea.

Board and Lodging.

Her numerous decks have such lengths of stairs and passage ways that one can easily lose oneself, and in fact I was on board her for hours and saw most of her accommodation, "fore, aft, and amidships," but never found her gymnasium, Turkish bath, swimming bath, or full-sized racquet court, enormous though the space must be which such equipments absorb. The *Olympic* herself is 46,359 tons gross, 22,350 tons register. She is 882 ft. long, 92½ ft. wide, and her load draught is 34·7 ft. Her 50,000 horse-power engines, working on four screws, drive her at 22 knots. When she goes to sea she has generally 3000 people on board; there are boats for 2600 and rafts for the remainder. She carries some 950 first-, 780 second-, and 1100 third-class passengers, with 800 of a crew to look after them, feed them, and keep them safe. The personnel of the chief steward's division is the most numerous, in all 564, amongst whom are the saloon and bedroom stewards and stewardesses; the chef, the chief baker, and the chief butcher and their associates, 90 of them, the staffs for the Turkish bath (male and female), gymnasium, and racquet court, and the barbers. The engine-room has a staff of 165 men now the ship is burning oil, and there are 89 sailors of various ranks and duties. Dr. J. C. H. Beaumont, the medical officer of the ship, and his associate, Dr. Robley Browne, had been instructed by Mr. Curry, the local manager, to show me round the ship of which they are naturally proud, and they kindly gave me every information. To them this account owes most of its interest. Before we get to business I may say that the sumptuous decoration of the best suite, that in which Miss Mary Pickford had just travelled, with its luxurious furniture and richly carved decorations, reminded me of nothing I had ever seen before in a ship; only in the Kaiser's dining-room at the Kiel Yacht Club, a room built ashore to simulate a cabin in a ship, could I recall a parallel.

Sanitation on board a ship is mainly a question of water, food, and air. Drinking water is here very carefully supervised. As it comes from the shore it is stored in well-cleaned cemented tanks, from which it is pumped to large receivers, whence it passes through Chamberland filters before it is distributed, sterilised, to the many small ice-filters all over the ship. Domestic water-tanks for washing water are cleaned and refilled each half voyage. The daily expenditure of water is about 250 tons.

Food on board these liners is so well cooked and so generously provided that it gives the hygienist no anxiety. The daily quantities used are expressed in large figures: meat, 4000 lb.; bread, 3000 lb.; fresh vegetables, 2500 lb.; poultry and fish, of each 2000 lb.; bacon, 1500 lb.; butter, 500 lb.; eggs, 6000; and potatoes, 3 tons. There are four kitchens, one for each first-class saloon (here the second-class meals, too, are cooked), another for the third-class, and a fourth for the crew. There are also separate bakeries. Milk is carried in special refrigerators, and there are separate cool chambers for meat, fish, butter, cheese, eggs, vegetables, and fruit, also for fruit and flowers brought on board by passengers.

Rival Ventilation Systems.

Ventilation is the crucial hygienic question in a ship. The builders of the *Olympic* did a very wise thing when to the three funnels the engine-room required they added a fourth as a ventilating uptake. A ship with her great hot engines necessarily overheats all the air within her, and that air will, of course, escape if a path is open to it, usually by cowls or hatches. Generally there are not enough of these openings, for in bad weather they would all let rain in and that might be even more unpleasant than bad ventilation. Here is the wisdom of a funnel for ventilation; the up-draught is always so strong that the descending rain is carried back, the draught is strong (the funnel rises 60 ft. above the deck), and the volume of air carried out of the ship is enormous. There are side ports in some cabins, through which some air is supplied. But there are inside cabins without ports, and there are the public rooms, as well as passages and sanitary annexes. These are all ventilated by a double system of supply and exhaust ventilating trunks. Fifty large fans force air into every part of the ship, taking their supply from eight thermo-tanks, which in cool or in cold weather warm the entering air to any temperature desired. Twenty-four suction fans are always taking the heated and used-up air out of the ship and discharging it up the ventilating funnel. In addition, each stateroom has an electric fan for hot weather and an electric radiator for winter, so comfort is well considered. In the old days, when the merits of plenum and vacuum systems were being discussed, I felt that, as the old saying has it, "baith's best," and I was pleased to find such good results from them here. So far as one could judge in harbour, and as regards the decks on which people live, the *Olympic* is an unusually well-ventilated ship. It is said on board that as a result there is never any smell of cooking, and that smoke does not remain in the large smoking rooms, both severe tests. Oil-burning also helps ventilation. There is now no coaling and no coal-dust to dread, so the ship is no longer hermetically sealed up for most of her time in harbour, but can be left open to air herself all the time she is not running.

Lavatories and Conveniences.

The first-class cabins have fixed basins and hot and cold water laid on. So have the second class. Wealth will obtain for you increased comfort. In a larger cabin you may have a hanging cupboard for your clothes, you can add a private bath (hot, cold, and spray) and also a private sitting-room. The first-class division includes a dining-room for valets and ladies' maids which is a comfortable place. In the third-class each cabin has a folding wash-place with a water-tank filled by hand daily. There are 16 bath-rooms in this section, and the cabins are quite good, even if small. The general third-class accommodation includes saloon, social hall, smoking-room, and children's room, with the poop and well-deck for open-air exercise, so that advances in comfort are not made only for millionaires. It was in the *Oceanic* years ago I first saw hot ovens for warming the plates of third-class passengers. One great advantage of these newer ships is their complete freedom from insect pests.

The stewards have their accommodation amidships, arranged in small dormitories for about 20, for each man a comfortable bed and a locker. Their lavatories, water-closets, and bathrooms are well equipped. Forward on the port side there is a large mess-room for stewards, with a bar. Here they may have their meals, though often they are so pressed for time that they prefer to get their meals in the old bad way, standing in the pantry. But at night, when their work is done, they have this mess-room of theirs for a canteen and recreation room—a vast improvement on old-time conditions. I should imagine this improvement to be due in

[1] The former article on Accommodation for Seamen in the *Aquitania* appeared in THE LANCET of Sept. 11th, p. 569. In that article the cubic dimensions of the cabin for two men should have been given as 648 (9×9×8) and not 728 cubic ft. 300 in the following line should read 220.

part to awakening conscience, but even more to the increasing size of ships, while the numbers of staff carried are not increasing quite so fast.

Seamen's Quarters.

The seamen, about 80, and engine-room staff (apart from officers) live forward in cabins very like those of the third-class passengers, but not all the beds are of that quality, for I saw several of the old "donkey's breakfast" pattern, beds stuffed with straw. Their cabins generally hold each three men, who can rarely be there together, and each has in it a basin. The seamen petty officers have a mess of their own, but the rank and file have their meals in a spacious mess-deck similar to that of the stewards, but over the other side of the ship, with fixed tables and forms for seats. The only place in the ship I did not like was the lavatory water-closet accommodation for "oil attendants." (I did not see the seamen's accommodation.) It was dingy. It had a yellow dado round it. I think everything else in the ship was painted white: a great thing, it costs money, but it shows up dirt and so increases health, and it raises the self-respect of the men. Whitewash is, of course, anathema, except perhaps overhead. The yellow dado gave one at once a suggestion of forlornness, discomfort, and neglect. The water-closet compartment was bounded by a considerable area of the ship's side. That had been painted with cork paint, but with very thin cork paint, not enough, in my opinion, to keep out the cold of English seas, let alone the winter temperature of New York. Surely those surfaces and the pipes there could be cased in wood, or at any rate have wooden shutters over them to keep the cold off. The water-closets were of the same order of comfort as the yellow dado. I think it was a trough closet, it was choked, the seats were wet and dirty and not scrubbed, there were no latrine-paper boxes, no latrine paper, and only a torn sheet of newspaper lying on the floor. There were lavatory basins with cold water only, and there were two douche-baths with hot and cold water. These last were the only fittings that gave any joy to an acquaintance I made at this point. He seemed to have nothing to do, and was very helpful—a fireman, he said, of the ship, and a Seamen's and Firemen's Union official, I gathered. I asked him to admire the accommodation for the men in this ship, but he would not. I asked him if he had ever seen better. He had, he said, in the German Merchant Service. It might have been; they were a good deal ahead of us before the war in looking after their crews. He complained of the water-closets, &c.—very reasonably, I thought. His tone was indignant and querulous, and I could not blame him. Seamen have found it hard to get their grievances redressed. Why not hot water to the men's wash-places? Their hands want a great deal of washing, even though the fireman of to-day, called now an oil attendant, talks of his work as a "gentleman's job," as it only takes sense, not physical toil, and involves no sweat and no dirt, and there is a hot-water supply close by.

Hospital Equipment and Nursing.

Dr. Beaumont showed me the very complete hospital equipment, a dispensary and operating-room, in which 89 anæsthetic operations were done in the three and a half years before the war. On no occasion was it necessary to stop or slow the ship, so steady is she. There is a hospital for men, a hospital for women, also a hospital for infectious diseases with a special uptake ventilation. There is also a very good padded cell. The whole is lavishly equipped. There are an incubator for dealing with suspected throat swabs, &c., a dental chair, and a gas apparatus. There are electric baths and an ultra-violet-ray bath. I noted that the bedside receptacles for seasick persons are fitted with papier maché containers which, when used, are burnt. There is a dispenser, who has with him a mate, the ship carries two certificated nurses, and there are two medical officers, as I have said. The medical examination of the steerage passengers is an anxiety. It must be very exactly done this side and repeated on the voyage, or there will be trouble with the immigration authorities on the other side; but for the moment the medical profession on board feels satisfied, as oil-burning has relieved the waiting-rooms of the formerly numerous cases of heat-stroke, colic, and wounds and abrasions of hands.

Before closing I must mention one of the many ingenious appliances on the bridge for facilitating navigation, the clear-view screen, allowing sights to be taken in rainy weather. The glass through which one regards the light whose position is wanted cannot be obscured by rain, snow, or fog as it is travelling round 1500 times a minute, and always comes up before your eye, warmed, dry, and transparent.

In conclusion I have to thank the company, and especially the local manager, Mr. Curry, for the particular courtesy with which they arranged that your representative should see everything thoroughly and comfortably, and also Dr. Beaumont, who got together for me so much of the detail which increases the interest of the above account.

MEDICAL EDUCATION IN AMERICA.

THE educational number of the *Journal of the American Medical Association* gives a moving picture of medical education in the United States. The facts, historical and actual, have been obtained by the courtesy of the authorities of the medical colleges in the United States, and are arranged in convenient tables which, when studied carefully, give clear pictures of the changes taking place. Of the 85 medical colleges now existing, 76 are described as non-sectarian, 5 as homœopathic, 1 as eclectic, and 3 as nondescript. A fifth class, the physio-medical, teaching a system of medicine from which all remedies are excluded except those derived from non-poisonous drugs, had 1 adherent college in 1850, 3 from 1902 to 1907, and is now extinct. The number of homœopathic colleges shows a steady descent from 22 in 1901 to 5 at present open. The eclectic schools show a similar decline, having numbered 10 in 1901. Eclecticism as it is known in America is a system of medicine which treats diseases by the application of single remedies to known pathological conditions, without reference to nosology, special attention being given to the development of indigenous plant remedies; an eclectic school is one which professes to select what is best from all other systems of medicine. The three so-called nondescript schools consist, in the words of the report, of two semi-osteopathic and one nominally eclectic affair. Two of them are not recognised even in their own State of Missouri and the third is in Massachusetts, which has a feeble medical practice law.

The total number (76) of non-sectarian medical schools has also steadily decreased from its maximum of 130 in 1906, but it is the more efficient colleges that have survived, and the proportion of students attending non-sectarian colleges has risen to 93·8 per cent. of the total number.

The Grading of Medical Schools.

Whereas in this country the choice of a medical school may safely be left to the individual student, who even if guided only by geographical position or a reputation for football cannot make a serious mistake, in America the standard of teaching and the value of the diploma when attained vary within wide limits. In fact, many of the diplomas given are recognised only in a few of the States. In order to protect the student from being enticed by misleading advertisements, and to raise the standard of medical education throughout the country, the Council of Medical Education and Hospitals of the American Medical Association has made extensive and repeated investigations of the training given at all the medical schools in the country and in Canada, and has rated them in three classes, A, B, and C, according to their degrees of excellence. The student is strongly advised to join a Class A medical school, where (as is shown by tables) the fees are as a rule no higher, and the length of course no longer, than in the poorly-equipped low-grade institutions.

Adequate instruction in the recognition, treatment, and prevention of diseases can be given only in acceptable (Class A) medical

schools, which have expert teachers, well-equipped laboratories, and dispensaries and hospitals where the student can study patients having all varieties of sickness and injuries.

Full details are given of the schedule on which the classification is based and of the standards required. The system of marking consists of establishing four general heads: (1) faculty, (2) product, (3) administration and supervision, (4) buildings and equipment, efficiency under each head being considered as of approximately equal importance, and being allowed 25 points.

Colleges obtaining 70 per cent. or above are rated in Class A, those obtaining from 50 to 70 per cent. in Class B, and those obtaining 50 per cent. or less in Class C. Class A colleges are those which are acceptable; Class B, those which, under their present organisation, give promise of being made acceptable by general improvements; and Class C those (*a*) which require a complete reorganisation to make them acceptable; (*b*) which do not keep satisfactory records of their students in regard to entrance requirements, attendance, grades in courses, division into classes, and reasons for promotion; (*c*) which do not enforce their requirements in regard to admission (including those admitted to advanced standing), promotion, and graduation; (*d*) which give the major portion of their instruction after 4 o'clock in the afternoon; (*e*) which are privately owned and conducted for profit; (*f*) which for other specific reasons are not eligible for inclusion in Class B.

The total number of Class A colleges in the United States is 70, including two homœopathic schools, all the rest being non-sectarian. It is satisfactory to note that 68 out of the 76 non-sectarian colleges (which, as we have seen, account for 93·8 per cent. of the total number of medical students) are acceptable, and that 89·6 per cent. of the total number of students are being educated at acceptable colleges.

The total number of medical students for the year ending June 30th, 1920, was 14,088, an increase of 1036 over last year; the number of students who graduated was 3047, an increase of 391 over 1919.

American Women in Medicine.

An interesting section of the statistics is that devoted to women in medicine.

During the past year there were 818 women studying medicine, or 132 more than last year, and 237 more than in 1918. The percentage of women to all medical students this year is 5·8, the largest percentage since the presenting of these statistics was begun. There were 134 women graduates this year, 27 more than last year, but 19 less than in 1917. Of all the women matriculants, 89 were in attendance at the one medical college for women, while 727 (90·1 per cent.) were matriculated in the 64 co-educational colleges. From the one women's college there were 12 graduates, while 122 (91·0 per cent.) secured their degrees from co-educational colleges.

This increase of women students in co-educational colleges is not surprising, since in recent years some of the largest and oldest medical schools, as Columbia, Tulane, the University of Pennsylvania, Harvard and Western Reserve University, have thrown open their doors to women.

Entrance Standards and Fees Payable.

The acceptable schools require a four years' high-school education or its equivalent, followed by two years' pre-medical college course consisting of chemistry, physics, biology, English composition and literature, and certain optional subjects, before admission. Among the directions laid down by the Council for the curriculum of an acceptable medical school are the following:—

The college should give two years of work consisting largely of laboratory work in well-equipped laboratories of anatomy, histology, embryology, physiology, physiologic chemistry, bacteriology, pathology, pharmacology, therapeutics, and clinical diagnosis. Present-day medical knowledge makes it essential that these subjects be in charge of full-time, well-trained teachers.

Two years of clinical work, largely in hospitals and dispensaries, with courses in medicine (including physical diagnosis, pediatrics, nervous and mental diseases), surgery (including surgical anatomy and operative surgery on the cadaver), obstetrics, gynæcology, laryngology, rhinology, ophthalmology, otology, dermatology, hygiene, and medical jurisprudence. With the higher entrance requirements time is now available in the latter part of the second year for beginning courses in physical diagnosis and the principles of surgery.

It is the policy of the American Medical Association that as soon as conditions warrant, relations should be established with a number of approved hospitals so that a fifth undergraduate year may be spent by the student as an intern under the continued supervision of the medical school.

Post-graduate Experience and Training.

There are now 18 post-graduate schools in the United States, of which 7 are connected with universities in which the graduate teaching is, or will be, as thoroughly and scientifically given as are the courses of the undergraduate medical school. The educational number does not deal largely with post-graduate work, but a list is given of 469 general hospitals throughout the country, which are considered in a position to furnish acceptable internships for medical graduates, followed by a list of 124 special hospitals. From the details supplied as to the number of beds, time and length of appointments, salary, and nature of experience to be obtained, the newly qualified man will get a fair idea of the kind of practical experience open to him.

The Cost of a Medical Examination.

The fees payable at the American medical schools vary within wide limits, and bear no relation to the grading. The majority charge between $125 and $225 a year for four years.

Although 45 colleges listed in Class A charge fees ranging from $150 to $350 per year for each student, the actual expense for teaching that student for the year in these colleges is much more than the fee charged. This larger expenditure is possible because the colleges receive either State aid or private endowment. This shows that no medical college can properly teach medicine on the income received from fees alone.

Taking the average at $175 a year, or, disregarding variations in exchange, roughly £150 for the four years; the fees will be found about equivalent to those in this country, where the composition fee varies in the neighbourhood of £200 for a five years' course.

Recent Changes.

The changes for the better that have taken place during the last 16 years in medical education in the United States have been noteworthy, and are summed up in a leading article which we quote:—

In 1904, when the Council on Medical Education was created, the United States had more medical schools than all other countries of the world combined, the supply far exceeding the needs of the country. While the number of colleges has been reduced from 162 to 85 during the 16 years, the number enforcing an entrance requirement of two years or more of collegiate work increased from four (2·5 per cent. of all colleges) in 1904 to 78 (92·9) in 1920. The number of medical students was decreased from 28,142 to 13,052—the lowest number—in 1919; but, during the same period, the number who had higher preliminary qualifications was increased from 1761 (6·2 per cent. of all students) in 1904 to 13,408 (95·2 per cent.) in 1920. The number of graduates was reduced from 5747 to 2656—the lowest number—in 1919; but the number having higher preliminary qualifications was increased from 369 (6·4 per cent. of all graduates) in 1904 to 2842 (93·3 per cent.) in 1920. While the annual totals of colleges, students, and graduates have been decreased by about 50 per cent., the number of better colleges is 19 times larger than in 1904, and the numbers of better qualified students and graduates are nearly eight times larger.

Many other improvements have been made in the medical schools. Formerly, a number of them had no university connexion, were conducted for profit, or were dependent solely on students' fees. Most of them had inadequate buildings and laboratory space, inadequate clinical material, and their curriculums were only partly graded. Now all but a few are integral parts of high-grade universities; they are enjoying increased incomes, either from State appropriations or private endowments; many have erected new college buildings and installed more and better-equipped laboratories; they have employed larger numbers of full-time teachers. The majority of these schools are now carrying on more or less effective research; all have established closer relationships with hospitals furnishing clinical facilities, and the majority have adopted better methods of teaching in both laboratory and clinical departments. These changes, the report concludes, are producing physicians who, both educationally and professionally, are far better equipped to assume the responsibility for the prevention and cure of disease than those graduating in any former period.

UNIVERSITY OF MANCHESTER. — The Vice-Chancellor, in his annual report, just issued, points out the serious extent to which the University is being crippled, the want of adequate funds affecting staff, accommodation, and research. The none too successful appeal for £500,000 at the close of last year realised less than half the sum required; the appeal is, however, still before the public. Including the School of Technology, 2775 students attended during the session, compared with 1649 in the previous session and 1415 in 1914–15. The women students now number 572, and of these 143 are studying medicine.

TUBERCULOSIS.

The Report of the Ministry of Health.

THIS Report, the appearance of which was briefly noted in THE LANCET last week, includes a colourless, but no doubt accurate, review of recent measures for dealing with tuberculosis. It is a tale of committees, recommendations, grants, and schemes. It does not reflect favourably on the wisdom and prescience of the Departmental Committee on Tuberculosis that it should in 1912 have set the tentative standard of one sanatorium bed and one hospital bed per 5000 of the population, but though the insufficiency of this standard is now admitted, the 1 in 1000 standard, as already established in Denmark, has not apparently been accepted by the Ministry. There are, however, interesting facts to be extracted from this Report, serving, as milestones on a dull road, to mark progress. There are now 15,781 beds for the tuberculous under voluntary bodies and local authorities, and 2258 of these beds were provided during the year under review. Up to March, 1920, proposals had been submitted for the provision of 9830 additional beds. Thus it appears that the crying need for beds is rapidly being made good. The staffing of the tuberculosis machine is also beginning to come up to strength, or nearly so. By the end of March, 1920, county councils had appointed 150 tuberculosis officers, and county borough councils another 108. Tuberculosis dispensaries have also been staffed by 41 tuberculosis officers under the schemes of the metropolitan borough councils. Even the dental welfare of the tuberculous, which has in the past suffered much stepmotherly inattention, is coming to the fore, and by the end of March, 1920, arrangements by 15 county councils and 20 county boroughs for dental treatment of the tuberculous had been sanctioned by the Ministry. In so chronic and subterranean a disease as tuberculosis the latent period between any given measure and the effect it produces on the mortality must necessarily be long and uncertain. But it is encouraging, even if the declining tuberculosis mortality is only in part traced to the activities of the Ministry, to note that whereas the deaths in England and Wales from all forms of tuberculosis in 1918 were 58,073, in 1919 they were only 46,312.

The Tuberculosis Beds of the M.A.B.

If the number of beds provided for the tuberculous is an index to the efficiency of an anti-tuberculosis campaign, then the Metropolitan Asylums Board is to be congratulated on its annual report for 1919–20. As Appendix C shows, the Board's existing and prospective accommodation for the tuberculous is one of 2593 beds. It is not yet possible to judge whether the needs of London have been met by this accommodation, existing and prospective, but the report suggests that the supply will approximately meet the demand. One of the latest steps to be taken by the Board has been the acquisition of an institution at Lowestoft with accommodation for 150 cases of surgical tuberculosis in adults. In the section dealing with finance it is pointed out that the Government originally promised to defray three-fifths of the capital cost of sanatoriums up to £90 per bed. Though this sum was doubled in 1918 the amount is quite inadequate, for it is calculated that three-fifths of the capital cost per bed is likely to exceed £500.

Sanatorium Benefit in Kent.

In the seventh annual report on tuberculosis in Kent Dr. Alfred Greenwood edits the reports received from the seven tuberculosis officers in charge of various districts in the county. The interest of these sectional reports is enhanced by the divergence of opinion, not to say conflict of opinion, expressed by their authors. Some are dogmatic, others agnostic. Stressing the potency of domiciliary infection, one tuberculosis officer calculates that in his area nearly 7 per cent. of his cases of pulmonary disease occurred in "contacts." Hence his plea for the isolation of the advanced and hopeless cases.

Another tuberculosis officer writes:—

"Many of our old beliefs are being shaken, and even the very infectivity of tuberculosis, as we have up to now understood the term, is being questioned ..... the cold truth remains that the medical profession is not yet in possession of the full requisite knowledge either as to the cause, prevention, or cure of tuberculosis."

The remedy is, in his opinion, research work. With regard to the conflicting claims of treatment at home or in a segregation camp, euphemistically termed an industrial colony, Dr. C. C. A. de Villiers, T.O. for district No. 6, advocates the establishment of workshops in each town or area, where men still undergoing treatment can be trained and employed while in receipt of their allowances.

"The training colonies are doing excellent work, but the large majority of men are either unable to comply with the conditions of admittance or are unwilling to leave their homes for any considerable period of time."

American Reports.

Trudeau Sanatorium (Thirty-fifth Annual Medical Report).—The reports published by this sanatorium are always stimulating as well as instructive, and Trudeau's successors show a happy combination of imagination, hustle, and perseverance. To combat the common tendency of sanatorium work to lapse into a rut of dull routine, all examinations and data found to be uninstructive are ruthlessly "scrapped," and new methods and points of view are constantly being studied. The X rays have been found to stimulate interest in the usual physical examination, and the Monday morning diagnostic clinics, where the entire staff meet to discuss individual cases, have proved a valuable whetstone on which to sharpen wits. Another prominent feature of the Trudeau Sanatorium is the close coöperation of clinical and laboratory work. Unfortunately, most sanatoriums provide few or no facilities for adequate research, although the problems of tuberculosis are obviously not going to be solved by the casual investigator. Among the papers published in conjunction with this report is one on the adrenalin test (Goetsch) between pulmonary tuberculosis and hyperthyroidism. It has been employed at the sanatorium for several years and has proved of considerable value.

Loomis Sanatorium, U.S.A. (Twenty-third Annual Report).—What, it may be asked, is the chief function of a sanatorium report? The authors of this report would be justified in calling it propaganda, for they have produced a beautifully illustrated work showing the attractions of the sanatorium surroundings in both summer and winter. Sandwiched in among these pretty pictures is much solid and useful information. Tuberculin, it appears, is given in only a few cases, whereas treatment by artificial pneumothorax is practised in about 19 per cent. of all the cases. The "gratifying success" achieved by this treatment is attributed to careful selection of cases and to the compression of the lung being gradual, except when severe hæmorrhage calls for rapid compression. Interesting studies have been carried out on patients suffering from hay fever, and their pollen sensitiveness was "skin-tested" in some cases with as many as six different pollen extracts. Practically all reacted to ragweed pollen. In addition to routine studies the sanatorium is undertaking: (*a*) an intensive statistical study of the previous year's work on complement fixation; (*b*) a study of the blood in acute cases of tuberculosis to determine the presence or absence of ferments; and (*c*) coöperation with the medical staff in a series of animal experiments on chemo-therapy in tuberculosis. It is evident from various other subjects discussed that Loomis Sanatorium is conducted on progressive and scientific lines.

LITERARY INTELLIGENCE.—Messrs. J. and A. Churchill announce a Text-book on Preventive Medicine, by Professor R. T. Hewlett and Dr. A. T. Nankivell, shortly to be published.—Messrs. Witherby and Co. announce that they will shortly publish a book entitled "A Naturalist in Himalaya," by Captain R. W. G. Hingston, *M.C.*, I.M.S.

CONTROL OF VENEREAL DISEASE:
RECENT CONTINENTAL MEASURES.

NORWAY.

Venereal Disease and Marriage.

RECENT legislation in Sweden dealing with venereal disease in relation to marriage [1] has its counterpart in Norway, and a comparison of the legislative reforms adopted in the two countries shows many parallel features. The Norwegian law, which came into force on Jan. 1st, 1919, does not deal at such length with venereal disease in its relation to marriage as the corresponding Swedish law, but as the following abstracts, for which we are indebted to the N.C.C.V.D., show, very important and far-reaching measures have been adopted to limit the spread of venereal disease, and to protect from infection the innocent party to the marriage contract.

Law of May 31st, 1918, Chapter I., §6.—A person infected with syphilis that is still infectious must not marry. The person who suffers from other venereal disease which is still infectious, or from epilepsy or leprosy, must not marry unless the other party to the contract is informed of the disease, and both parties have been given oral instruction by a doctor as to the dangers involved. The professional secrecy enjoined by the law on doctors does not apply to their disclosure, to the proper authority, of information intended to hinder a marriage being contracted contrary to the enactments of this paragraph. Doctors may be summoned as witnesses in matrimonial law-suits, and paragraph §178 of the criminal law does not apply to doctors in this connexion. The doctor who knows that the subject of any of the above diseases is taking steps to get married under this law is bound to communicate his knowledge to the proper authority.

Chapter II., §13, Nr. 5.—In connexion with the publication of the banns, each of the prospective parties to the marriage contract must give a written declaration to the effect that syphilis is not present in an infectious stage, and whether or not any other venereal disease still in an infectious stage or epilepsy or leprosy exists. If in the declaration the admission is made of the existence of a venereal disease other than syphilis, or of epilepsy or leprosy, proof must be given that the other party to the contract has been informed of this disease, and that both parties have been instructed by a doctor as to the dangers of the disease in question.

Chapter IV., §35, Nrs. 3 and 6.—In connexion with the annulment of marriage, this may be effected if one of the contracting parties has hidden from the other the fact that insanity existed before or at the time of marriage, or venereal disease still existed in an infectious stage, or epilepsy or leprosy, or an incurable physical deformity preventing sexual intercourse. The marriage may not be annulled unless this cause for annulment is pleaded within eight months of the date when the pleader was first informed of this cause.

Chapter V., §49.—A marriage may be annulled when one party can prove that the other party, knowing or suspecting that he or she suffered from venereal disease in an infectious stage, exposed the other party to infection by physical intercourse. If infection has not occurred, and if the disease is no longer infectious, the plea for annulment on these grounds cannot be made later than six months after the risk of infection has ceased. In this matter medical professional secrecy is ruled by the same conditions laid down in Chapter I., §6.

Instructions to Doctors Consulted about Venereal Disease.

In connexion with this law the Norwegian Medical Director has addressed a circular to all medical practitioners in Norway containing suggestions drawn up by the professor of dermatology in the University of Christiania.

Syphilis.—Owing to the capricious course run by syphilis, long periods of latency being interrupted by outbreaks of infectious symptoms, it has always been difficult to decide when a man or a woman who has contracted syphilis may marry with safety. Even the introduction of salvarsan and the combined salvarsan-mercury treatment and the diagnostic and prognostic assistance afforded by Wassermann's reaction have not made these problems easier. There is at present no reliable evidence as to the results of modern treatment, and such evidence is hard to obtain for lack of uniformity of treatment, not only in different countries, but in one and the same country. It can only be claimed that definitely better results are obtained than heretofore; but the disease is still apt to run an aberrant, uncontrolled course when least expected. It is, therefore, clear that the rules to be framed with regard to marriage must still be drawn up with severity and with an eye to the capriciousness of the disease.

A man or woman who has suffered from secondary syphilis must not marry till the expiration of two years after the completion of treatment, and he or she must during this interval have shown no clinical symptoms. The more vigorous the treatment the greater the confidence with which permission to marry can be given, but it is impossible to demand that treatment should be standardised; it should be regulated according to the needs of the individual case. As a rule, the patient should undergo several courses of treatment in the first two years after the outbreak of the disease. It is usual to insist on Wassermann's reaction being negative. It is, however, difficult to depend on this criterion, for there are cases in which this reaction remains positive or soon passes from negative to positive in spite of treatment being vigorous. Yet in such cases there may be no further outbreak of the disease. It should also be noted that in several cases a positive reaction, which has been refractory to prolonged treatment, subsequently becomes negative for good. Tact and discretion are needed, and the decision should preferably be left to the medical man who has treated the patient and followed the course of the disease.

Should the disease break out afresh after the completion of treatment—a rare event if the treatment has been consistently carried out—thorough treatment should be instituted and permission to marry be withheld till the lapse of a one-and-a-half to two-year symptom-free interval and the demonstration of a negative Wassermann reaction. With regard to the woman, a new course of treatment should be recommended before she marries, however long a symptom-free period has passed. The object of this additional precaution in the case of women is the health of the progeny. Cases in which primary syphilis has been thoroughly treated and Wassermann's reaction has never been positive occupy a special position. Usually a complete cure is effected, and marriage may be permitted one to two years after the completion of treatment, provided there have been no clinical symptoms and Wassermann's reaction has remained negative throughout this period. As treatment in such cases takes only a few months, permission to marry may be given two to two and a half years after infection. But it is absolutely essential in these cases that the abortive treatment should have been carried out properly with a series of salvarsan injections, and that the case should have been under close medical supervision.

Code of Rules for Infected Persons.

With reference to Chapter I., §6, according to which the subject of venereal disease (other than syphilis) in an infectious stage and the subjects of epilepsy and leprosy must not marry unless the other party to the contract is cognisant of the disease and both parties have been given verbal instruction by a medical man as to the dangers incurred, the following suggestions and rules have been drawn up by the professors of dermatology and nervous diseases, and by the chief medical officer concerned with leprosy.

Gonorrhœa.—The prospective candidate for marriage, who has suffered from gonorrhœa, should be informed that many cases of acute gonorrhœa are not absolutely cured, but pass on to a chronic stage giving rise to such trifling symptoms that it may be completely overlooked. Yet such an apparently mild catarrh may sooner or later give rise to infection in the other party to the marriage. It is, however, a mistake to assume that every chronic catarrh following acute gonorrhœa is gonococcal. Indeed, most of these chronic catarrhs are not infectious. But it is very difficult to distinguish between gonorrhœal and non-gonorrhœal catarrhs, and the differential diagnosis should be made only by an expert. As chronic, as well as acute, gonorrhœa is far more frequent in men than women, medical men will be consulted chiefly by males, to whom it should be made clear that the transmission of the disease to women entails far-reaching consequences. Among these are sterility, which imposes mental as well as bodily deprivation. If the prospective candidate for marriage is a woman, suffering from chronic inflammation of the reproductive organs, suspected by her to be gonorrhœal, her medical adviser should first make sure of his diagnosis. This is a most difficult matter, requiring much time and careful examination; a single negative microscopic examination is of little significance. Many such examinations must be made at suitable intervals and only when a long series has proved negative can gonorrhœa be definitely excluded. Should gonorrhœa be diagnosed, the woman should be firmly dissuaded from marriage till she has undergone thorough treatment and has received her medical adviser's permission. Should she marry before she is cured she will not only infect her husband but she may also provoke an exacerbation of the disease in herself, rendering it incurable. Should her husband be cured after much suffering and prolonged treatment he may again contract the disease if his wife has not in the meantime been cured. In this manner gonorrhœa, which has evaded eradication at the time of marriage, may prove exceedingly difficult to stamp out.

Ulcus Molle.—Candidates for marriage who suffer from, or who have recently been under treatment for, this disease should be told that they may not marry till further propagation of the disease is impossible and assurance can be given that syphilis has not also been contracted at the same time as the chancroid. To be on the safe side this person should undergo Wassermann's test eight or nine weeks after infection. If this test is negative and there are no clinical symptoms it is permissible to assume the absence of syphilis.

With regard to Chapter II., §13, Nr. 5, it may be noted that when either of the prospective parties to marriage suffers from venereal disease, epilepsy, or leprosy the authorities celebrating the marriage must be assured that both parties have received instructions from a physician as to the dangers entailed. In this connexion a medical certificate is required. The law also refuses to recognise the privilege of professional secrecy in these matters; medical evidence may be called in litigation involving marriage, and a physician who knows that a person contemplating marriage suffers from any of the above diseases is bound to communicate his knowledge to the authorities concerned. In this connexion the medical profession is urgently reminded that contravention of the marriage law by persons suffering from one of the above diseases must not be facilitated by a conspiracy of silence on the part of the

[1] THE LANCET, 1919, vol. ii., p. 1164.

medical profession. In other words, active intervention is expected of the medical profession under certain conditions.

DENMARK.

Registration of the Syphilitic.

One of the movements in Denmark towards stamping out venereal disease which has aroused most discussion and criticism during the last two years is based on the principle of notification followed up by the registration and subsequent permanent supervision of every case of syphilis. More than one scheme has been outlined with this object in view, but its principal aims are kept in view by all concerned. The difficulties of such a universal centralised scheme are numerous and obvious, but Denmark offers exceptionally favourable opportunities for a comprehensive survey and control of all its syphilitic inhabitants, as its population is comparatively small and concealment and evasion are correspondingly difficult. Already one-half to two-thirds of all the cases of syphilis in Copenhagen are said to be under the care of State or municipal medical officers, and this material alone should form an admirable nucleus on which to build an elaborate system of research and treatment. It is proposed that every patient's dossier should be filled in a central office, where information as to his history, symptoms, reactions, and terms of treatment would be collected and analysed. By such a scheme, which would include periodic clinical and serological examinations, much would be learnt as to the development of tertiary phenomena, including disease of the central nervous system. The scheme would also enable pathologists to correlate their post-mortem findings with the patient's clinical and serological records. The cost of such a scheme would be negligible when viewed in the light of the financial burden already borne by the community in its treatment of general paralysis and other syphilitic diseases.

SWITZERLAND.

Compulsory or Voluntary Measures?

In the *Schweizerische medizinische Wochenschrift* for July 15th Dr. Gustav Peter, of the dermatalogical clinic in Zurich, crystallises the principal problem of venereal disease in the question, Is a policy of propaganda and education alone sufficient to promise the suppression of this disease? In other words, Can an appeal to the individual's reason and good sense be so fruitful that compulsory measures can be omitted? His emphatic answer in the negative is largely the expression of the experience he has gained at the dermatological polyclinic in Zurich during two and a half years. The 1000 male patients who attended for venereal disease in this period were classified according as the results of free treatment were good, bad, or indifferent. In 763 cases the disease was gonorrhœa and in 396 it was syphilis. Thus there was a total of 1159 cases, the additional 159 representing the combination of gonorrhœa and syphilis in the same patient. In 143 cases of the 1000 reinfection occurred more than once. As Dr. Peter's tables show, the prognosis, as careful investigation of every case indicated, was good only in 52 per cent.; in 47 per cent. it was bad. Unsatisfactory as these figures are, he does not consider them misleading, and he quotes Philip, who, in 1914, analysed the histories of 1433 insured patients suffering from syphilis in Hamburg. In 89 per cent. they were found to be most inadequately treated, and only in 11 per cent. was even comparatively effective treatment carried out. A significant feature of the Zurich figures was the fact that in as many as 35 per cent. the age of the patient was under 25 years. Another deplorable fact was the frequent incidence (15 per cent.) of reinfection. These are the findings which have driven Dr. Peter to conclude that "the main cause of the failure of our efforts is the psychological factor." How, he asks, can we expect to prevent by educational and voluntary methods healthy persons from contracting venereal disease when we find that those already infected are so callous as not to carry out the treatment nor to practise the advice given them? Not only do they neglect treatment, but in many cases they expose themselves to reinfection, and thus render nugatory whatever results previous treatment may have achieved. In this connexion it is deplorable that neither syphilis nor uncomplicated gonorrhœa gives rise to much pain; as a rule, the treatment is considerably more painful than the disease. And this contributes not a little to the triumph of folly and indolence over the well-intentioned and oft-repeated advice of experts. Hence the necessity for legislation ensuring compulsory treatment, and Dr. Peter prophesies that compulsion will prove to be the only effective solution of the problem of venereal disease.

CANADA.

(FROM OUR OWN CORRESPONDENT.)

Medical Pioneers in Western Canada.

AT the fifty-first annual meeting of the Canadian Medical Association, held in Vancouver during June, the President, Dr. Robert E. McKechnie, of that city, dealt chiefly in his presidential address with medical affairs in Western Canada, which he described as one vast country stretching from Winnipeg to Vancouver. Dr. McKechnie considered the medical outlook of Eastern Canada to be insular, whereas in the western provinces, with their uniform conditions of rapidly developing country and similar problems to face and overcome, they had a better perspective, were free from local prejudice, and could more easily criticise and appreciate themselves. When it is realised, however, that this sentiment was expressed at the annual meeting of the national medical body, many of whose members had journeyed from the Far East to the Far West, the idea of any material sectional cleavage in the medical profession in Canada cannot very well be entertained. Speaking for British Columbia, the President told of the first medical men who are shown by any existing record to have practised in the Pacific province—William Anderson, surgeon on H.M.S. *Resolution*, and John Law, surgeon on the *Discovery*, both of whom accompanied Captain Cook on his first and last voyage in 1778. Anderson died of consumption, and Cook appointed a Mr. Samual, surgeon's first mate, as surgeon to the *Discovery*, Law being removed to the *Resolution*. In 1792 Spanish warships entered the Straits of Juan de Fuca, having with them one Louis Galvez, surgeon, who was reputed very skilful. In the same year Captain Vancouver appeared on the scene as an agent of Britain, and took the country from the Spanish. Accompanying him were three surgeons, the most important member of that group being Menzies, surgeon's mate to Watson on the *Chatham*. He was trained at Edinburgh, and equally skilful as scientist and physician. At the end of the voyage Vancouver complimented him, saying that no life had been lost through sickness for a period of three years. Menzies made great collections of plants, &c., and these are to-day gathered in three places—the British Museum, Kew, and the herbarium of the Botanical Society of Edinburgh. From 1792 there is a blank in the medical history of British Columbia. In 1850 a new generation of medical men began to arrive, the first being John Sebastin Helmcken, surgeon to a ship of the Hudson Bay Company, which came round the Horn. Dr. Helmcken is still living in the city of Victoria at the ripe age of 95 years. He was born in London, England, in 1825, and was educated at Guy's Hospital. At one time he was the leading practitioner from San Francisco to the North Pole, there being no other doctor throughout that vast region. Among other pioneers in medicine were John C. Davie, Simon J. Tunstall, J. W. Powell, O. M. Jones. The profession to-day in all western provinces is counted, not by hundreds, but by thousands of men, many of them in isolated localities, not perhaps making money, but devoting their lives to the service of humanity.

Canadian Society of Anæsthetists.

The Canadian Society of Anæsthetists has recently been organised for the purpose of promoting the science

of anæsthesia, its practice and teaching. As nearly all large Canadian hospitals now have specialists in anæsthesia on their staffs, it is fitting that these should form themselves into an organisation for mutual benefit and study. The officers of the society are: President, Dr. Samuel Johnston, Toronto; Vice-President, Dr. William Webster, Winnipeg; secretary-treasurer, Dr. Wesley Bourne, Montreal. The first annual meeting will probably be held in Montreal in October of this year, at the time of the meeting of the American Clinical Congress of Surgeons.

American College of Surgeons.

The Clinical Congress of the American College of Surgeons will be held in Montreal about Oct. 20th. It is expected that it will be the largest medical convention ever held in Canada. The programme is chiefly clinical in character, and as the clinics will be held at the hospitals admission will be by registration and ticket. Many eminent surgeons are expected from Canada, the United States, France, and Great Britain.

Changes in the Canadian Medical Services.

Major-General Carleton Jones, sometime Director of the Canadian Medical Services, has taken up his residence in Italy. Major-General John Taylor Fotheringham, C.M.G., who succeeded him, has recently retired from the service and re-entered private practice in Toronto as consulting physician. Before laying down his office General Fotheringham issued a farewell statement expressing his deep sense of the constant loyalty and high efficiency of the Canadian service as a whole, both overseas and in Canada, and of his indebtedness, as officer administering the service in Canada, to the personnel as a whole.

Toronto, Sept. 2nd.

VIENNA.

(FROM OUR OWN CORRESPONDENT.)

Dangers of Fresh Milk for Babies.

SOME time ago attention was called by an article in the periodical, *Kosmos*, to the ill-effects of fresh cow's milk upon babies in a number of districts, and recent investigations have proved the statements there made to be true. It has been ascertained that in certain districts of the country the high infant mortality remains almost unaffected in spite of the strenuous efforts of local health authorities. Close examination reveals the facts that gastro-intestinal troubles are in the majority of cases the underlying cause of death and that these illnesses are traceable to the milk with which the babies are fed. As such troubles are restricted to certain districts, the cows and their food were suspected. It was actually found that certain plants and weeds eaten by cows in the pastures contained substances passing over into the milk and acting as severe irritants to the infantile human gastro-intestinal canal without causing discomfort to the animal itself. The following plants were frequently found to be detrimental: meadow-saffron, corncockle, common convolvulus, and vetch. These weeds proved to be distinctly dangerous, especially if growing on sandy or lime-containing ground. Individual idiosyncracy or predisposition played a marked rôle in the production of untoward effects. During the war, when the number of cows diminished rapidly in this country and goats were kept in increasing numbers, such irritative effects were noted more often, as the latter animals are even less sensitive to irritant herbs. The effectiveness of the campaign against infant mortality is more apparent in the low-lying parts of the country, where the above-mentioned plants are less apt to flourish. Agricultural circles, as well as the medical profession, should exercise vigilance in this matter.

The Housing Problem.

A serious menace to the welfare of the population, especially in Vienna, has arisen in the problem offered by the condition of buildings used for human habitation. Vienna, the capital of a dwarf State of six millions of inhabitants (of whom fully one-third dwell in the city itself) cannot expand as it ought to. Before the war the annual increase of dwellings amounted to 9000, and even at that figure there was a noticeable scarcity of lodgings. For six years nothing has been built, partly owing to the absence of all labourers at the front, partly owing to the fantastic rise in prices of material and labour which set in as soon as the war came to an end. When the soldiers returned marriages took place at the rate of hundreds a day, with the result that at present over 25,000 dwellings, or 2500 houses, are needed to accommodate these newly-married couples alone. The old houses become slowly but surely dilapidated. Sanitary arrangements and renovations are not being attended to because the rent of lodgings is being kept at the pre-war level by legislation, and slums cannot be abolished. The housing problem is becoming a burning question, and the only remedy—money—is not forthcoming. Owing to overcrowding, to the insufficiency of nourishment, and to the prevalence of tuberculosis the poorer classes of the population—the middle classes, the brain-workers, the State and municipal officials—are unable to grapple with the needs of the time, and are rapidly sinking in the social scale. The municipality and the State have made arrangements for the erection of about 400 houses, containing about 2000 dwellings, for their officials and workers, but much time will elapse before these lodgings can be fit for use, and in any case their number is sadly insufficient.

Decrease of Hunger Œdema.

The Union of Sick Clubs reports to the Board of Health that hunger œdema is disappearing steadily and not too slowly amongst the 343,000 labourers of both sexes who are members of the Union. During the worst years of the war the dystrophic conditions were also noted amongst other sections of the population, as well as in other countries—Roumania, Germany, and Serbia. In Vienna during 1917 the reported cases amongst members of the Union of Sick Clubs alone averaged 115 per month, the maximum of 220 being reached in July and August. In 1918 the average was 114 per month, the July figure being 234; the maximum was 259, in August. Then the number fell constantly, and in 1919 the average was 42 cases, the worst months being March with 72 and May with 78. In 1920, January, with 20 cases, was the worst month, and the figure dropped to 6 in July. But cases still occur, and the disease must be absolutely eradicated not only from amongst the labourers, but also from amongst other classes of the population. As an illustration of the actual conditions, it might be mentioned here that the American Famine Area Assistance Committee, which has done such noble work amongst our half-starved children, has decided to open a "war kitchen" for professors and lecturers of the University, because the majority of these men are unable to procure the materials and the fuel necessary for a regular household. Cases of hunger œdema are not absolutely unknown amongst the so-called middle classes.

Drop in Price of Pharmaceutical Articles.

The Government has taken a decided step in keeping down, or rather bringing down, the exorbitant prices of medicines and allied articles by procuring a large quantity of different remedies—aspirin, iodine, codeine, morphine, cocaine—in foreign markets and distributing it by means of the Central Apothecary Board to the various chemists and dispensaries. This stock will be sold to the public at prices far lower than the present ordinary price of these articles, and the poorer classes will thus be able to obtain medical help and relief besides the advice given them gratuitously in the hospitals. Hospitals will also be allowed to dispense such remedies free of charge in certain cases of poverty. No small part of the sufferings of our population were due to the fact that genuine medicines were not obtainable, products of lesser efficiency being substituted for them. Cod-liver oil, for instance, is even now so scarce that a gift from a Norwegian Society consisting of about three barrels of this precious substance was received with the utmost pleasure by our Board of Health for distribution in the children's hospitals.

Sept. 15th.

Correspondence.

"Audi alteram partem."

AMERICA AND POST-GRADUATE MEDICAL STUDY IN LONDON.

To the Editor of THE LANCET.

SIR,—Perhaps your readers will be interested in what was to me a startling item of news. A young qualified physician from one of the Middle Western States of the United States came to my office saying that he was on his way to do some advanced work at Vienna. He said that a committee in Chicago had circularised the physicians in his State, saying that they had organised an excursion for physicians to go to Vienna for study as before the war American physicians were accustomed to do. The committee gave assurances that they had prepared the way for the reception of these physicians in Vienna and for the offering of old-time facilities. Furthermore, the committee were prepared to aid in securing steamer passages and passports. I expressed surprise that one, in the present famished condition of Vienna, and in view of the disruption of the war, should attempt to go there for study. I then presented the facilities for advanced medical study in Great Britain and in London. My acquaintance replied that it was the impression among the physicians in his community that the British medical faculty were not particularly cordial in the reception of American students, and that despite the fact of the great clinical advantages of London the post-graduate work was so submerged and intermingled with the under-graduate work that the opportunities were not comparable with those which were formerly enjoyed in Vienna and Berlin.

Inasmuch as it is one of the functions of my office to promote the exchange of American professors and the interchange of migrating students with the British, and to direct here the stream of American students earlier going to the Continent, it seems as if I ought to apprise the medical schools and hospitals of the above fact.

If properly organised I believe no better authorities or facilities for post-graduate work exist anywhere than here. But unless something is done at once it is evident that our late enemies will soon recover the patronage and prestige that they had before the war. If the British-American fellowship of our nations is so important to the future peace and progress of the world, as is frequently proclaimed, how important it is that not only our universities but also our great professions coöperate in making personal contacts and professional studies in common.

This is a critical and opportune moment. Evidently there is no time to lose. My office, which represents some 60 of the leading Universities and Colleges of the United States, the Institute of International Education in New York, the American Council on Education, the American Association of University Professors, and the Association of American Colleges, is maintained primarily for the service of American professors and students, particularly graduate students. A cordial welcome has thus far been given by the British to the office and our students, but in the field of medicine it seems to me particularly desirable that the interest already shown by the British brethren should be applied immediately to the further organisation and promotion of post-graduate study.—I am, Sir, yours faithfully,

GEORGE E. MACLEAN,
Director, British Division of the American University Union in Europe.

50, Russell-square, London, W.C.1, Sept. 17th, 1920.

*** The general object of the American University Union in Europe, as stated on its notepaper heading, is to serve as a bond between the Universities of the United States and those of European nations, especially by encouraging the attendance and advancing the welfare of American students at the Universities of France, Great Britain, and Italy, in such ways as the trustees may see fit. We comment elsewhere on Mr. MacLean's letter.—ED. L.

THE MASS TREATMENT OF HOOKWORM INFECTION.

To the Editor of THE LANCET.

SIR,—In your issue of July 10th, which I have only just seen, Dr. S. T. Darling takes up the position that diagnosis of ankylostome infestation by the finding of ova in the stools being, as now carried out by the lay microscopist, expensive, time-consuming, and untrustworthy, and disinfestation by anthelmintics being impossible, and indeed unnecessary, all that is needful, once infestation has been detected in a community, is promiscuous treatment, preferably by two half treatments of oil of chenopodium, the staff then passing on to another area, leaving the inhabitants of the first greatly improved in health.

The position, were the premisses sound, would be capable of defence. The premisses are not sound. It is true that as ordinarily carried out microscopic diagnosis is all that Dr. Darling says of it. I have shown, for example, that about half a c.cm. of stool must be examined in the case of Indians of the labouring class before a negative diagnosis of hookworm infestation can be made, since in mild infestations only one egg may be present in somewhat less than that quantity. Further, the strained and centrifuged residue from an aqueous suspension of this quantity of stool must be spread over an area of 24 square inches, if full visibility is to be obtained and accuracy of diagnosis ensured.

Of course, such examination in sparse infestations is expensive, time-consuming, and, since the requisite quantity of stool is probably never examined, untrustworthy. But why not blame the technique and look for something better? I have been able to show in this connexion that by a simple and easily learnt manipulation for washing the sediment of a stool, obtained by fulfilling certain simple conditions as to the straining and centrifuging of a fæcal suspension, there is removed practically all of the fæcal matter, which, however, carries away with it about one-sixth of the ankylostome ova present, and there is left on two square inches of slide five-sixths of the ova from half a cubic centimetre of stool, and practically nothing else. This technique has been labelled "levitation." Is it expensive? That is scarcely the point. The question should be, Is it worth the money? That depends upon a variety of matters, and will be mentioned below. Does it save time? In sparse infestations it saves hours. Is it trustworthy? In the hands of two Indian medical men, trained in levitation and working in jails of the United Provinces of India, it gave an infestation of 84·4 per cent.; while in 326 post-mortem examinations made in that part of India the reports of which have been collated by the Rockefeller Foundation, the percentage of infestation was 82·2. These figures, together with a consistent failure to find ova in a second $\frac{1}{4}$ c.cm. of levitated stool if the first have proved negative, suggest that levitation will give a positive diagnosis in fresh stools in all cases where there are ova in the bowel: that it is in itself time-saving and accurate.

The lay microscopist can be trained to accuracy, and by a modification of what I have described as the "standardising method" he can be checked the whole time, so that it is his administrator's fault and his own good fortune if his falls from grace be not speedily detected. These men are not relatively expensive if employed in numbers in a central laboratory. But this implies that stools must be preserved if they are to reach such a laboratory in a state suitable for levitation. Figures so far as available (they require addition) show that by the use of certain preservatives, and certain preservatives only, levitation gives good results in preserved stools. In such a central laboratory the work will be arranged in shifts, the cheap lay microscopist dividing his time between the attention-straining microscope and the centrifuge and levitation technique which allow of rest to mind and eye, an arrangement which will definitely add to accuracy of work.

The problem of accurate, rapid, and cheap diagnosis seems much nearer satisfactory solution, to put the matter at its worst, than Dr. Darling's paper suggests;

but before we know where we stand there are a number of techniques to be standardised and compared, always remembering that a technique which with certainty concentrates only 10 per cent. of ova may yet for general or particular occasions be better than one which similarly concentrates 80 per cent., provided that the former can start with ten times as much stool as the latter. This being the position regarding diagnosis, it is surely inadvisable, one might perhaps say retrograde and unscientific, to undertake indiscriminate treatment without preliminary diagnosis. Further, when death follows, not necessarily results from, treatment, as must occur from time to time when millions are involved, the procedure simply invites trouble from the suspicious and disaffected, who are sure to say, "Here is a man killed by a dose of medicine given when there was no evidence that he even required it." Such incidents are not in the best interests of mass disinfestation.

Regarding treatment, it is well that the unsatisfactory character of our best anthelmintics, as disclosed by accurate diagnosis, should be emphasised. Dr. Darling feels that it justifies the policy of making no attempt to render a community entirely free from infestation. It is well to realise that in the absence of a satisfactory type of latrine this entails acquiescence in certain and rapid re-infestation with all its grave consequences. It seems no answer to say that this will recur in any case, for it is reasonable to assume that the more complete the disinfestation the fewer foci of infection will remain, and the longer and greater will be the benefit to the community before the whole work has to be undertaken again. That complete disinfestation is unnecessary for the individual cannot, in view of the present trend of medical knowledge and opinion on infections generally, and on this infestation in particular, be accepted without proof. Many will at least agree that the deliberate retention in a given area of unnecessary foci of infection is a grave sanitary sin; while it is unquestionable that to give immigrants a routine treatment and then loose them on a country in the belief that this procedure will keep that country free from ankylostomes can only lead to grave disappointment.

But the crux of the whole problem is, by its title, excluded from Dr. Darling's paper. It is this. So long as there exists no sanitary latrine suitable for the single hut so long is it impossible to eliminate ankylostome infestation from the rural tropics. An insanitary latrine is as dangerous as an insanitary filter, and there has latterly actually appeared in the literature evidence of what one suspected must be occurring—namely, dejectional infestation—infestation, that is, acquired during defæcation, and indeed from the very latrine which was not suspected to be capable of conveying it.

The essentials of the problem seem to be these. The benefits which can, at least temporarily, be conferred upon hundreds of millions of persons should not be withheld because our methods are admittedly imperfect; so long as it is clearly recognised that they can only be temporary and correspondingly costly. At the same time, research must be urgently pushed through on at least three matters: 1. The determination of the best method of mass diagnosis by the standardisation and comparison of the techniques recommended for the removal of fæcal matter from ova, techniques which enable eggs to be detected rapidly and certainly in all cases where they are present in the stools. 2. The search for a drug which will in a single dose, and without risk to the host, remove all hookworms. 3. The designing of a cheap, effective, sanitary, and fool-proof latrine suitable for a single family in the rural tropics.

The morbidity, poverty, infertility, stunting of body and mind, and the mortality resulting from ankylostome infestation in the hundreds of millions of persons affected is in the aggregate so great that the question of cost ought to be of minor importance when any line of investigation is promising in fruitfulness. This is, unfortunately, by no means to say that it will be, although it is one of the most attractive commercial propositions which have ever been offered to any Government.—I am, Sir, yours faithfully,

CLAYTON LANE,
Ealing, W., Sept. 15th, 1920. Lieutenant-Colonel, I.M.S. (retd.).

THE LATE DR. LEONARD GUTHRIE.

To the Editor of THE LANCET.

SIR,—A photograph of the late Dr. Leonard Guthrie is wanted by many friends at this hospital, but difficulty is being experienced in procuring one suitable for reproduction. I should be glad if readers of THE LANCET could tell me of any photographs in existence, and particularly grateful for the loan of one. Great care would be taken to preserve and return it; reproduction would not injure the print in any way.

I am, Sir, yours faithfully,

H. W. BURLEIGH,
Secretary and General Superintendent, Hospital for Epilepsy and Paralysis, Maida Vale,
Sept. 17th, 1920. London, W.

The Services.

POSTPONEMENT OF COMPETITIVE EXAMINATION IN THE INDIAN MEDICAL SERVICE.

IT is announced that no competitive examination for the Indian Medical Service will be held during 1921. Arrangements for the appointment of candidates by selection in India and in England will, however, be continued. The question of resuming the examination in January, 1922, is under consideration, and an announcement will be made on the subject early next year.

ROYAL NAVAL MEDICAL SERVICE.

Surg. Comdr. R. St. G. S. Bond has been appointed Professor of Hygiene at the R.N. Medical School, Greenwich.

ROYAL ARMY MEDICAL CORPS.

Capt. R. C. Matson is placed on the half-pay list on account of ill-health contracted on active service.

Temp. Capt. E. G. M. Gilchrist relinquishes the acting rank of Major.

Temp. Capt. J. E. Measham to be Lieutenant and to be temporary Captain.

Lieut. (Hon. Capt.) F. D. Ross-Keyt, from T.F. Res. (Arty.), to be Lieutenant.

Officers relinquishing their commissions:—Temp. Lieut.-Cols. (and retain the rank of Lieutenant-Colonel) E. Goodall (on ceasing to be employed at the Welsh Metropolitan Hospital), J. B. Byles (on ceasing to be employed at the Brook War Hospital); Temp. Major N. G. Cooper (and retains the rank of Major); Temp. Capt. F. Hannigan; Temp. Capts. (and retain the rank of Captain) W. Garton, R. Hamilton, J. N. M. Sutherland, J. R. Watson; Temp. Lieut. F. T. Allen (and retains the rank of Lieutenant).

TERRITORIAL FORCE.

Capt. (acting Lieut.-Col.) H. S. Beadles relinquishes his acting rank on ceasing to be specially employed.

Capt. E. J. Boome to be Major.

Capt. S. J. Fielding, from T.F. Reserve, to be Captain.

Capt. T. B. McKee resigns his commission and is granted the rank of Major.

Capt. D. A. Wilson resigns his commission, and retains the rank of Captain.

Capt. H. H. L. Ellison (late temporary Captain, R.A.M.C.), to be Captain.

1st London Sanitary Company: Lieut. F. Rae to be Captain.

The King has approved the retirement of Col. C. N. C. Wimberley, who retains the rank of Colonel.

INDIAN MEDICAL SERVICE.

Temp. Capts. Khaliq Dad, Bhola Nath, and Mohammad Afiyat Khan relinquish their commissions and are granted their rank.

DEATHS IN THE SERVICES.

Lieut.-Col. Arthur Holbrook Nott, I.M.S., who died suddenly on August 20th from heart failure while on a visit to the Engadine, at the age of 58, received his first commission in 1887, and reached the rank of Lieutenant-Colonel 20 years later. He had held the post of Civil Surgeon at Murshidabad.

AN International Economic Conference will be held at Caxton Hall, Westminster, London, S.W., from Oct. 11th to 13th. The subjects for discussion will include the present obstacles to economic reconstruction, international finance, problems of coal, transport, and raw material, and cooperative production and distribution as a measure of reconstruction. Visitors and delegates are expected from America, Austria, Belgium, France, Germany, Holland, Italy, and Switzerland. In connexion with the Conference a public meeting will be held in the Central Hall, Westminster, on Oct. 13th, at 8 P.M. Further particulars and tickets can be obtained from the Secretary, Fight the Famine Council for Economic Reconstruction, 150, Southampton-row, London, W.C. 1.

Obituary.

SIR JOHN WILLIAM BYERS, M.D., M.CH. R.U.I., M.A.O. (*hon. causâ*),

PROFESSOR OF MIDWIFERY, GYNÆCOLOGY, AND DISEASES OF CHILDREN, QUEEN'S UNIVERSITY OF BELFAST.

WE regret to announce the death, in his sixty-seventh year, of Sir John Byers, which took place at his home in Belfast on Sept. 20th as a result of cerebral hæmorrhage, closely following on the death of his intimate friend, Mr. Robert Campbell, whose obituary notice he wrote. Prominent in most movements that concern the public weal, he was closely associated with the campaign against tuberculosis and with the reduction of infant mortality, while as a gynæcologist and pediatrist he had more than a local reputation. For many years he was a valued correspondent of THE LANCET, where he placed his wide knowledge of men and things without stint at the service of his profession. A man of warm heart and holding strong views, he ever strove to be just to those who differed from him.

Born at Shanghai in 1853, John William Byers was the son of the Rev. John Byers, a China missionary, and of Margaret Byers, née Morrow, one of a group of famous women educationists, who became LL.D. Dub., and founded the Victoria College at Belfast. His academic record was equally distinguished. He attended the Royal Academical Institution, and later Queen's College in Belfast, and became at the latter senior scholar in natural science as well as in medicine, midwifery, and medical jurisprudence. Both at the B.A. and M.A. examinations he was gold medallist and first in the honours list. At the M.D., M.Ch. R.U.I., in 1878, he again took high honours. Beginning to practise in Belfast, he was appointed physician to the Hospital for Sick Children, holding that position until 1893, when he was appointed professor of midwifery in Queen's College, Belfast, a post which he held for 16 years. In the meantime he became examiner in obstetric medicine at the Royal University of Ireland. In 1909 he was appointed to the chair of midwifery, gynæcology, and diseases of children at Queen's University, which he was still occupying at the time of his death.

His interest in public affairs took Byers to many important gatherings at home and abroad. He presided over the International Congress of Obstetrics and Gynæcology held at Geneva in 1896, over the Section of Obstetrics at the annual meeting of the British Medical Association at Cheltenham in 1901, over the Section of Physical Education and Training in Personal Hygiene at the International Congress of School Hygiene held in London in 1907, and over the Conference on the Hygiene of Childhood at the Royal Sanitary Congress held at Belfast in 1911. Nearer home he naturally occupied the chair at meetings of the Ulster Medical Society and the Belfast Branch of the Irish Medical Association. His practical interest in child welfare was shown in an eloquent introductory address to the students of the London School of Medicine for Women in 1906, when he foreshadowed the important part which women were soon destined to play in the solution of public health questions. Lady Byers did as a matter of fact establish the first babies' club in Belfast some two years later. Sir John Byers was himself one of the first to see and inculcate the importance of antenatal supervision of motherhood in avoiding the causes leading to stillbirth or death in the early months of independent existence. The human element was to him an essential part of maternal welfare, and he was never party to any separation of mother and child or to the substitution of institutional for home life.

As diversions from professional study literature and folk-lore were among Byers's hobbies; his contributions to the Belfast Literary Society were always of interest if not of permanent value. The Belfast Natural History and Philosophical Society also owed him much.

Sir John Byers received the honour of knighthood in 1906. To Lady Byers and three sons who survive him we tender heart-felt sympathy.

PROFESSOR ARMAND GAUTIER.

THERE was in France no more ardent worker for chemical science in its relation to medical advance than Emile Justin Armand Gautier, whose death in his eighty-third year was recently announced. Gautier had been President of the Academy of Science at the Institute of France and occupied the chair of Mineral and Organic Chemistry for 45 years in the Paris Faculty of Medicine. His father, a medical man, gave him the incentive to scientific work, and he chose chemistry as a professional career with conspicuous success. He took a warm interest in chemical forensic questions, and became impressed with the possibilities of error in analytical conclusions based upon the extraction and identification of alkaloids. Reactions which he obtained with extracts from the cadaver appeared identical in certain respects with those given by well-defined bodies of vegetable origin now regarded as alkaloids. But Gautier, while he succeeded in isolating certain bases from putrescent material and in showing that they gave responses to chemical reagents akin to those by which plant alkaloids were identified, adduced no direct evidence to show that these substances were toxic. He called them ptomaines, and food poisoning has been frequently attributed to such bodies. We now have good reason to believe that food poisoning, when it occurs, is of bacterial origin, due not to poisons produced outside the body, but rather to infection from the bacteria themselves when introduced into the human organism. But Gautier undoubtedly deserves credit for the attention given to food poisoning, which led to our present enlightenment. His views were not narrow, any more than the inquiries which he undertook into the widespread distribution of arsenic, the impurities of the air of towns, the "faking" of wines, and the constituents counting for evil in tobacco smoke. He was also a vigorous investigator of many questions in chemistry relating to molecular construction and constitution. By his death France has lost a notable savant.

URBAN VITAL STATISTICS.

(Week ended Sept. 18th, 1920.)

English and Welsh Towns.—In the 96 English and Welsh towns, with an aggregate civil population estimated at nearly 18 million persons, the annual rate of mortality, which had been 9·9, 10·0, and 10·3 in the three preceding weeks, fell to 10·2 per 1000. In London, with a population of nearly 4½ million persons, the annual death-rate was 9·8, or 0·1 per 1000 below that recorded in the previous week, while among the remaining towns the rates ranged from 3·5 in Exeter, 3·6 in Ealing, and 4·3 in Lincoln, to 15·4 in Bury, 15·5 in Wigan, and 16·6 in Rotherham. The principal epidemic diseases caused 280 deaths, which corresponded to an annual rate of 0·8 per 1000, and comprised 182 from infantile diarrhœa, 54 from diphtheria, 19 from whooping-cough, 13 from scarlet fever, 7 from enteric fever, and 5 from measles. Whooping-cough caused a death-rate of 1·6 in Wolverhampton. The deaths from infantile diarrhœa, which had been 150, 171, and 171 in the three preceding weeks, rose to 182, and included 46 in London, 15 in Liverpool, 13 in Sheffield, 9 in Hull, and 7 in West Ham. There were 2953 cases of scarlet fever and 1591 of diphtheria under treatment in the Metropolitan Asylums Hospitals and the London Fever Hospital, against 2633 and 1484 at the end of the preceding week. The causes of 21 of the 3494 deaths in the 96 towns were uncertified, of which 4 were registered in Birmingham and 2 each in Leicester, Liverpool, and Preston.

Scotch Towns.—In the 16 largest Scotch towns, with an aggregate population estimated at nearly 2½ million persons, the annual rate of mortality, which had been 11·1, 9·8, and 11·2 in the three preceding weeks, rose to 11·3 per 1000. The 270 deaths in Glasgow corresponded to an annual rate of 12·7 per 1000, and included 10 from infantile diarrhœa, 5 from small-pox, 2 from diphtheria, and 1 each from enteric fever and scarlet fever. The 63 deaths in Edinburgh were equal to a rate of 9·6 per 1000, and included a fatal case each of scarlet fever, diphtheria, and infantile diarrhœa.

Irish Towns.—The 107 deaths in Dublin corresponded to an annual rate of 13·4, or 0·7 per 1000 below that recorded in the previous week, and included 12 from infantile diarrhœa and 3 from whooping-cough. The 114 deaths in Belfast were equal to a rate of 14·4 per 1000, and included 9 from infantile diarrhœa, 3 from scarlet fever, and 1 each from enteric fever and diphtheria.

Medical News.

ST. MARY'S HOSPITAL MEDICAL SCHOOL APPEAL.—The authorities of this medical school have issued a booklet of 15 pages in which the urgent needs of the school and the arguments in support of the appeal are set out. The importance of medical education to the country and the increased expenditure entailed by modern requirements in teachers, accommodation, laboratories, and equipment are explained in terms comprehensible to the lay public, for whom the book is intended. The need for rebuilding the school is urgent, but with great economy and the use of existing walls it is estimated that the cost will not exceed £30,000. This estimate does not include a block for the pathological institute, where the director, Sir Almroth Wright, and his staff still work in laboratories adapted from wards originally intended for midwifery beds. It is proposed to supply more adequate accommodation for the institute and to release these wards for their original purpose. This part of the scheme is estimated to cost £40,000; the rest consists in the endowment of chairs of (1) Industrial Medicine; (2) Hygiene, Public Health, and Preventive Medicine; and (3) Pharmacology; and of four scholarships of £250 each per annum for promising graduates. The appeal is addressed especially to the heads of great industries and to those interested in medical education in general and in the co-education of men and women, as the continuance of this system at St. Mary's is dependent on the provision of increased accommodation. A preliminary appeal committee consists of Mrs. Lloyd George, Lady Rhondda, Lord Linlithgow, Sir Robert Kindersley, Sir Clifford Allbutt, Sir Malcolm Morris, Mr. Guy Kindersley, Mr. A. R. Prideaux, Sir Almroth Wright, and Mr. T. M. Taylor. Donations, which, if desired, may be earmarked for a particular object, should be sent to Mrs. Lloyd George at 10, Downing-street, London, S.W.1., or to the Dean at the Medical School.

OPENING OF SESSION IN LONDON MEDICAL SCHOOLS.—The following announcements have reached us:—

King's College Hospital Medical School.—The session will be opened on Oct. 1st, at 3 P.M., when Mr. F. Richardson Cross will deliver the introductory address.

London (R.F.H.) School of Medicine for Women.—The introductory address will be given at 8, Hunter-street, Brunswick-square, London, W.C., by Miss A. Maude Royden on Revolutionary Thought at 3 P.M. next Friday, Oct. 1st.

Middlesex Hospital Medical School.—The introductory address will be delivered by Professor T. Swale Vincent at the Scala Theatre on Friday next, Oct. 1st, at 3 P.M., after which prizes will be distributed by Earl Beatty.

St. Mary's Hospital Medical School.—The opening of the winter session will take place on Friday next, Oct. 1st, at 3 P.M., when Professor J. G. Adami will distribute the prizes in the library. As already announced, the annual dinner of past and present students will be held at the Connaught Rooms at 7 P.M., Sir John Goodwin presiding. In the course of the evening a testimonial will be presented to Dr. M. M. Bird, the retiring medical superintendent of the hospital.

Westminster Hospital Medical School.—The introductory address will be given at 4 P.M. on Thursday next, Sept. 30th, by Dr. A. M. Gossage in the Board Room of the Hospital.

WEST LONDON POST-GRADUATE COLLEGE.—The autumn session opens on Monday, Oct. 11th, when Sir William Bull will give the inaugural address at 5 P.M. Medical practitioners are cordially invited to attend.

LONDON HOSPITAL MEDICAL COLLEGE.—A special course of lectures open to students and post-graduates has been arranged by the Surgical Unit for Wednesdays and Fridays in October. Two lectures on Some Points in Orthopædic Surgery will be given by Mr. T. H. Openshaw on Oct. 6th and 8th; Dr. J. H. Sequeira will lecture on Tumours of the Skin on Oct. 13th and 15th; Mr. Hugh Lett will lecture on Enlargement of the Prostate on Oct. 20th and 22nd; and Mr. Richard Warren will lecture on Surgery of the Lung on Oct. 27th and 29th. All lectures will be delivered in the Units' Lecture Theatre, London Hospital, E., at 4 P.M.

MEDICAL DEFENCE UNION.—The annual meeting was held at 11, Chandos-street, London, W., on Sept. 16th, Sir John Tweedy, the President, occupying the chair, when a conspectus of the year's activities was presented. During 1919-20 the work of the Union had been steadily maintained, many important actions being successfully defended in the courts, while equally satisfactory had been the number of cases settled out of court to the advantage of the members. Membership had steadily increased in spite of an advance in the subscription to £1. 584 new members were elected as compared with 169 in 1918. The solicitors reported that 138 cases had been referred to them, 86 of this total relating to general and miscellaneous matters; the large proportion of cases falling under this head was explained by the fact that many members had required assistance in putting their affairs in order after returning from war service. The financial report showed an increase in subscriptions of £711 over the corresponding figures for 1918. On Dec. 31st, 1919, the surplus assets over the liabilities, after making the necessary reserve for income-tax, were just over £9000. By a new arrangement coming into force on Jan. 1st, 1921, each member of the Medical Defence Union will be provided with indemnity against damages and costs awarded against him to the extent of £2,500 in any case which is undertaken by the Council of the Union.

THE Hughlings Jackson lecture of the Section of Neurology will be delivered at the Royal Society of Medicine by Dr. Henry Head, F.R.S., on Oct. 7th, at 8.45 P.M. Dr. Head has chosen as his subject, "A New Conception of Aphasia."

A MEETING of the General Council of the National Council for Combating Venereal Diseases will be held on Tuesday, Oct. 12th, at 3.30 P.M., the place of meeting to be announced later.

CHARING CROSS HOSPITAL MEDICAL SCHOOL.—The annual dinner of past and present students will be held in the Adelaide Gallery, Gatti's Restaurant, on Monday, Oct. 4th, at 7 for 7.30 P.M.

LONDON (R.F.H.) SCHOOL OF MEDICINE FOR WOMEN.—A luncheon will be held at the Fishmongers' Hall on Tuesday, Oct. 19th, at which representative men and women will meet to support the school. Sir Alan Anderson, honorary treasurer of the school, will preside, and will be supported by Dr. Mary Scharlieb, Miss Aldrich-Blake, Dr. Jane Walker, Lady Barrett, Dr. Louisa Garrett Anderson, and other medical women.

MANCHESTER TOWN-PLANNING SCHEME.—An inquiry on behalf of the Ministry of Health was held at Manchester on Sept. 15th into a proposed town extension scheme, involving 5269 acres situated chiefly on the southern side of the city. The total cost of the scheme would be over £3,300,000, and at least 50 years would be required for its completion. The principal features are the construction of 56 new streets, several of which would be 100 feet wide, running from three main arterial roads; the limitation to a maximum of 16 in the number of houses to the acre; and the relegation of new smoke-producing factories to a particular area. Provision is made for controlling the density of future building in the area, to preserve as far as possible the open character of districts not yet over-crowded. Building of warehouses and factories, except such as produced no inconvenience, would be confined to the eastern portion. Power is also sought to prohibit offensive advertisements and to prevent gardens or allotments from being kept in a state of nuisance.

CAPITAL VALUE OF MEDICAL PRACTICE: THE DARTFORD SCHEME.—The Dartford scheme to maintain the capital value of a general practice originated at a meeting of the practitioners of Dartford and district, when the question was raised of the approaching loss of the capital value of practices, a loss which becomes more and more serious as larger classes are brought into insurance. The original scheme was purely local, but it was considered possible to develop on the same lines a national scheme whereby doctors might insure payment of the capital value of their practices to their representatives or to themselves when they retired from active work. The scheme was therefore brought before various bodies concerned with medical politics, and has now been officially adopted by the Kent Local Medical and Panel Committees, and is recommended for adoption to their constituents. If these approve the Minister of Health will be asked for his sanction. The scheme is that every year there shall be taken from the county or borough medical pool before its distribution a sufficient sum to pay to each doctor who has retired a sum equal to one year's purchase of his panel practice. This sum will, of course, have been provided by the practitioners to whom the amount would otherwise have been distributed, but each of these will be able to draw a like sum when he retires. In effect, on his retirement each practitioner will be able to sell his practice to his fellows for one year's purchase. The actual terms of the resolution moved by Dr. M. W. Renton at the meeting of the Kent Committees on Sept. 8th, and approved by them, is as follows:—

That in view of the following facts—i.e.: (*a*) That a retiring practitioner had formerly a saleable asset in the goodwill of his practice, and (*b*) that this asset is, or may be, diminished by the coming into operation of National Health Insurance, and (*c*) that the Kent Local Medical and Panel Committees are extremely

anxious to provide against the economic difficulties which are certain to ensue, and particularly in the case of sudden death or incapacitating illness of practitioners, and (*d*) that for administrative reasons no payments could conveniently be arranged except from the medical pool, which is not under the control of these committees:

These committees advise the practitioners of Kent to authorise them to strongly urge upon the Minister of Health that he should, as early as possible, give his permission, make regulations or promote such legislative enactment as may be required to authorise the following payment, i.e.:—

(*a*) A payment of one year's purchase price of his panel practice in the event of a practitioner's death or his retirement from practice owing to old age or infirmity.

(*b*) A lesser payment if he retires for the purpose of starting practice elsewhere—e.g., in Harley-street.

It is pointed out in an explanatory note that the lesser payment is on a sliding scale and is necessitated by the possibility that a practitioner might relinquish his practice just for the purpose of claiming payment and then move elsewhere and repeat the process. It is considered to be further justified in that the primary object of the scheme is to protect widows and wives of those who suddenly fall ill and to provide a little capital for the doctor's old age. Further details are given of the scheme as at present drafted and of the advasntage to be anticipated from its adoption.

HOSPITAL CONDITIONS IN BRISTOL.—At the half-yearly meeting of the Bristol General Hospital Mr. Herbert M. Baker, the chairman, was able to report a substantial increase in subscriptions and donations, which totalled £20,000, as against £16,000 during the corresponding period of last year. It is true that expenditure showed an even greater rise, but the figures warrant a hope that the voluntary sources of income may yet prove equal to the strain that is being put on them.—A number of representatives of the boot and shoe industry and of other factories in the Kingswood district of Bristol have declared their intention of forming a committee to organise collections in factories and workshops for the support of the voluntary hospitals. The Cossham Hospital is a general hospital for East Bristol, founded only a few years ago on a very generous endowment by the will of the late Mr. Handel Cossham; it is now on the verge of debt. It is hoped that whether by voluntary aid or by subsidies from such bodies as the Ministry of Pensions or the Gloucestershire County Council this hospital may still be saved from falling into debt.

BRITISH HOSPITALS ASSOCIATION MEETING AT BIRMINGHAM.—A meeting of this association was held on Sept. 16th at the General Hospital, Birmingham, and was attended by representatives from the West Midland region, comprising Herefordshire, Shropshire, Staffordshire, Warwickshire, and Worcestershire. Sir Arthur Stanley presided, and emphasised the need to strengthen the organisation in view of the legislation anticipated in the future. The Ministry of Health, he said, welcomed the organisation and was anxious to retain the voluntary system. Sir Napier Burnett dealt with the present and future financial needs of voluntary hospitals. He estimated that something like a million pounds was required to put the hospitals of the country back into the position they occupied in 1914. He could see no relief from present anxieties while so many hospitals relied on their present methods of raising money by circulars and spasmodic appeals. Those methods were losing power, and the public was weary of the multiplicity of appeals. It was necessary to supplement the appeal to the ordinary subscribers by a regular stream of weekly collections from the employees of factories, workshops, and business houses, and by guaranteed amounts from employers. The workers were willing to pay a voluntary levy, but the hospitals must create the machinery for its collection. The amount of workmen's contributions per available bed ranged from £1 in some towns to £51 in others. It would have to be explained that the hospitals were of value to a patient's family, to his employer, to insurance companies, to the State, to the municipality, and to a patient's fellow-workers. The almoner system of obtaining contributions from patients might be found effective in many cases. Insurance companies gave meagre financial support in return for what the hospitals were doing for the insured. Municipalities, too, took advantage of the voluntary institutions without making an adequate return. Thus burdens were placed upon the voluntary principle which it was not intended to carry. It was the duty of the State to see that the necessary accommodation was provided for its workers, who might be injured in building up the work of the nation. Some form of State subsidy was required in return for the work which the hospitals did for the State. But it should bear no direct relationship to maintenance. For if it did, as a capitation grant increased, so would voluntary support recede, until in the course of a few years the hospitals would be financed entirely by the State. The subsidy should be limited to providing the requisite additional hospital accommodation, a certain amount of equipment, payment towards the cost of training nurses, and the encouragement of pathological and bacteriological research. Municipally controlled hospitals had proved to be more costly than voluntary institutions. He suggested that in order to overcome present difficulties some of the Poor-law hospitals should be loaned or handed over for use as general hospitals.

RED CROSS CONFERENCE AT BIRMINGHAM.—A conference promoted by the British Red Cross Society and the Order of St. John of Jerusalem was held in Birmingham on Sept. 16th with the object of bringing county organisations into closer touch with headquarters. The Lord Mayor presided and Sir Arthur Stanley gave an address. He said he was certain that much voluntary work must be done in time of peace if the country were to be prepared for war. He did not want his successors to go into the next war as they did into the last, with about £7000 and a set of patterns, almost all of which were wrong, as their whole equipment. When the war ended they were left with a joint war committee and a considerable sum of money. It was realised that the union of the two principal Red Cross agencies should continue and a joint council had been formed. This was followed by the suggestion to form in every county a joint committee, which should coöpt representatives of the other kinds of work they hoped to do in peace time, the object being to coördinate the various branches of voluntary work and to prevent the enormous amount of overlapping and waste of effort that existed at present. Outlining the work of a peace programme, Sir Arthur Stanley said that obviously the first consideration would be services in connexion with the men of His Majesty's Forces who were sick and wounded during the war. Much required to be done, and the joint societies ought to stand to the pensions hospitals in exactly the same position as they stood to the military hospitals during the war. Assistance would also be given to orthopædic clinics and curative establishments. Child-welfare and tuberculosis work must also be undertaken. A motor ambulance service was being established in the counties; 300 or 400 motor ambulances had been brought back from the battle fronts and placed in various districts, and they had a scheme for covering the country with a network of ambulances, so that no patient should be more than 15 miles from an ambulance centre. In reply to questions as to the future status of V.A.D.'s Sir Arthur Stanley said that an answer was being pressed for from the Army Council. It might be taken as certain that the V.A.D.'s would remain part of the Territorial Force, and that their recruiting and training would be left to the two societies.

Appointments.

DUNCAN, D., M.B., Ch.B. Glasg., has been appointed Certifying Surgeon under the Factory and Workshop Acts for North Nottingham.

WILLAN, R. J., F.R.C.S., Temporary Honorary Surgeon to the Royal Victoria Infirmary, Newcastle-upon-Tyne.

Vacancies.

For further information refer to the advertisement columns.

Aberdeen Royal Infirmary.—Jun. M.O. £500.

Aberdeen University.—Lectureship in Bacteriology. £600.

Barnsley, Beckett Hospital and Dispensary.—Sen. H.S. £250.

Barnstaple, North Devon Infirmary.—H.S. £200.

Battersea General Hospital (incorporated), Battersea Park, S.W.—Third Res. M.O. £200.

Bedford County Hospital.—Asst. H.S. £150.

Birmingham, Monyhull Colony for Epileptics and Feeble-minded.—Res. M.O. £700.

Birmingham, Queen's Hospital.—Three H.P.'s, three H.S.'s, Obstet. and Ophthal. H.S., and Cas. H.S. £90 each.

Brighton, Royal Sussex County Hospital.—Asst. H.S. £150.

Cancer Hospital (Free), Fulham-road, London, S.W.—H.S. £150.

Carnegie Dunfermline Trust.—Asst. M.O. £500.

City of London Hospital for Diseases of the Chest, Victoria Park, E.—Tuberc. O. £600.

Colchester, Essex County Hospital.—H.S. £200.

Colonial Service.—M.O.'s for West African Medical Staff, Government Service in Malaya, East African Protectorates, West Indies (including British Guiana), Fiji, and the Western Pacific, &c.

Countess of Dufferin's Fund, India, Women's Medical Service.—Three Medical Women. Rs. 350 per mensem.

Downpatrick, Down District Asylum.—Two Asst. M.O.'s. £300.

Dumfries, Crichton Royal.—Asst. P. £350.

East London Hospital for Children and Dispensary for Women, Shadwell, E.—H.S. and H.P. £125.

Glamorgan County Asylum, Bridgend.—Jun. Asst. M.O. £350.

Glasgow District Mental Hospital, Gartloch, Gartcosh.—Asst. M.O. £350.

Hospital for Consumption and Diseases of the Chest, Brompton, S.W.—Asst. Anæsth. £25. Also Asst. Res. M.O. £150.

Hospital for Sick Children, Great Ormond-street, W.C.—Cas. M.O. £200. Also Asst. Cas. M.O., H.S., and H.P. £50 each.

Huddersfield Royal Infirmary.—Two Asst. H.S.'s. £150 each.

Hull Royal Infirmary.—Asst. H.S. £150.
Ingham Infirmary and South Shields and Westoe Dispensary.—Jun. H.S. £175.
Johannesburg, South African School of Mines and Technology.—Professorship of Vet. Anat. £860.
Leeds City.—Asst. M.O. £500.
Leeds City Hospitals, Seacroft.—Asst. M.O. £300.
Leyton Urban District Council Education Committee.—Oculist, £125.
Liverpool, Royal Southern Hospital.—H. P. and H.S. £100.
Macclesfield General Infirmary.—Res. H.S. £200.
Maidstone, Kent County Mental Hospital.—Jun. Asst. M.O. £300.
Maidstone, Kent County Ophthalmic Hospital.—H.S. £300.
Manchester, Hulme Dispensary, Dale-street, Stretford-road.—H.S. £400.
Manchester Northern Hospital for Women and Children, Park-place, Cheetham Hill-road.—H.S.
Manchester, St. Mary's Hospitals for Women and Children.—H.S. for Whitworth Park Hospital. £100.
Metropolitan Asylums Board Infectious Hospitals Service.—Jun. Asst. M.O.'s. £515 6s.
Monmouthshire Asylum, Abergavenny.—Jun. Asst. M.O. £350.
Montrose Royal Asylum.—Asst. M.O. £350.
Newcastle-upon-Tyne, Hospital for Sick Children.—Two Hon. Asst. S.'s.
Norfolk County Mental Hospital, Norwich.—Sec. Asst. M.O. £350.
Northampton, County Borough Education Committee.—Female Asst. Sch. M.O. £500.
North Riding County Asylum, Clifton, York.—Temp. Asst. M.O. 7gs. per week.
Oxford, Radcliffe Infirmary and County Hospital.—H.P. £200. Also Administrator. £600.
Plymouth, South Devon and East Cornwall Hospital.—H.S. £200.
Pontypridd Urban District Council.—Female Asst. M.O. £550.
Prince of Wales's General Hospital, Tottenham, N.—H.P. and H.S. £200. Jun. H.S. and Jun. H.P. £120.
Queen's Hospital for Children, Hackney-road, Bethnal Green, E.—H.S. £100.
Royal Eye Hospital, St. George's Circus, S.E.—Sen. and Jun. H.S.'s £100 and £75. Also Clin. Asst.'s
St. Mary's Hospital for Women and Children, Plaistow, E.—Hon. S.
Samaritan Free Hospital for Women, Marylebone-road, N.W.—H.S. £150.
Sheffield Royal Infirmary.—H.S. £150.
Somerset, Wells Asylum.—Asst. M.O. £300.
South Mimms, near Barnet, Clare Hall Sanatorium.—Res. Asst. M.O. £300.
Sydney University, New South Wales, Australia.—Chair of Dentistry. £1100. Also Chair of Physiology. £1150.
University College Hospital Surgical Unit, University-street, W.C.—Third Asst. £300.
Ventnor, Royal National Hospital for Consumption and Diseases of the Chest.—Asst. Res. M.O. £300.
West Hartlepool, Cameron Hospital.—H.S. £300.
Westminster Hospital, S.W.—P. or S. Dis. Skin.
Westmorland County Education Committee and Kendal Borough Education Committee.—Dent. Practitioner. £500.
Wigan Infirmary.—Hon. P. and Asst. Hon. P.
Wilts County Council.—Asst. County M.O.H. and Asst. Sch. Med. Inspec. £600.
Wolverhampton County Borough Education Committee.—Asst. Sch. M.O. £500.
Wolverhampton and Staffordshire General Hospital.—H.S. £200.
Worcestershire County Council.—Sch. Oculist. £50.
Worcester County and City Mental Hospital, Powick.—Jun. Asst. M.O. £350.

The Chief Inspector of Factories, Home Office, S.W., gives notice of a vacancy for a Certifying Surgeon under the Factory and Workshop Acts at Southall.

Births, Marriages, and Deaths.

BIRTHS.

POULTON.—On Sept. 17th, at The Downs, Woldingham, Surrey, the wife of E. P. Poulton, M.D., F.R.C.P., of a daughter.
WHITE-COOPER.—On Sept. 7th, at "North Ford," Dartmouth, Devon, the wife of W. R. White-Cooper, M.B., B.S. Lond., of a son.

MARRIAGES.

GRANT—HODGKINSON.—On Sept. 15th, at St. Giles' Church, Bradford-on-Tone, Somerset, Dr. Gerald Wallace Grant, M.C., to Dorothy Beevor Milnes, only daughter of Mr. and Mrs. Edwin Beevor Hodgkinson, of Risdons, Bradford-on-Tone.
LAWBY—GREGORY.—On Sept. 15th, at the Parish Church, Poynton, Cheshire, James Littleton Lawry, M.D. B.S. Lond., M.R.C.S. Eng., L.R.C.P. Lond., to Dorothy Evelyn, youngest daughter of the late William Gregory, of Sheffield.
MOSER—BYGOTT.—On Sept. 16th, at Wem, Salop, Captain Richard Moser, late R.A.M.C., to Ellen, elder daughter of Mrs. Bygott and the late Edward Bygott, of Wem.

DEATHS.

BYERS.—On Sept. 20th, in Belfast, Sir John William Byers, M.D., M.Ch. R.U.I., aged 66.
MCKINNON.—On Sept. 15th, at King's College Hospital, Dr. A. A. McKinnon, of British Guiana.
PIGEON.—On Sept. 3rd, killed in action in Mesopotamia, John Walter Pigeon, M.B., B.C. Camb., Captain, Indian Medical Service, aged 33 years.
SHOPPEE.—On Sept. 15th, at Warwick-road, Cliftonville, Margate, Edward Collett Shoppee, M.R.C.S. Eng., L.R.C.P. Lond.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths

Medical Diary.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

WEST LONDON POST-GRADUATE COLLEGE, West London Hospital, Hammersmith, W.

MONDAY, Sept. 27th.—2 P.M., Mr. B. Harman: Eye Department. 2 P.M., Mr. MacDonald: Surgical Out-patients.
TUESDAY.—2 P.M., Dr. Burnford: Medical Out-patients. 2 P.M., Mr. T. Gray: Surgical Out-patients.
WEDNESDAY.—2 P.M., Mr. Addison: Operations. 2 P.M., Dr. Owen: Medical Out-patients.
THURSDAY.—2 P.M., Mr. Baldwin: Orthopædic Department. 2 P.M., Mr. B. Harman: Eye Department.
FRIDAY.—2 P.M., Mr. T. Gray: Surgical Out-patients. 2 P.M., Dr. Pernet: Skin Department.
SATURDAY.—10 A.M., Dr. A. Saunders: Medical Diseases of Children. 2 P.M., Dr. Owen: Medical Out-patients.
Daily:—10 A.M., Ward Visits. 2 P.M., In-patient, Out-patient Clinics and Operations.

ST. MARK'S HOSPITAL, City-road, E.C.
Course of Lectures on Proctology.
TUESDAY, Sept. 28th.—2.30 P.M., Dr. F. Crookshank: Mucous Colitis.
WEDNESDAY.—2.30 P.M., Mr. H. Graeme Anderson: Fissure.
THURSDAY.—2.30 P.M., Sir Gordon Watson: Operative Treatment of Hæmorrhoids. 4.30 P.M., Dr. S. S. Wyard: Pathological Specimens.
FRIDAY.—4.30 P.M., Mr. L. E. C. Norbury: Sigmoidoscopy.
SATURDAY.—2.30 P.M., Mr. W. B. Gabriel: Demonstration of Cases.

MANCHESTER FRENCH HOSPITAL POST-GRADUATE LECTURES, 24, Acomb-street (behind Whitworth Park).
THURSDAY, Sept 30th.—4.15 P.M., Dr. A. C. Magian: Ovarian Pregnancy.

BOOKS, ETC., RECEIVED.

CHURCHILL, J. AND A., London.
Catalysis and its Industrial Applications. By E. Joblin, M.C. 2nd ed. Pp. 141. 7s. 6d.
A Course of Lectures on Medicine to Nurses. By H. E. Cuff, M.D. 7th ed. Pp. 257. 7s. 6d.
Materia Medica, Pharmacy, Pharmacology, and Therapeutics. By W. Hale-White, K.B.E., M.D., Colonel, R.A.M.C. (T.). 17th ed. Pp. 712. 10s. 6d.
Surgery. A Text-book by Various Authors. Edited by George E. Gask, C.M.G., D.S.O., F.R.C.S. Eng., and Harold W. Wilson, M.S., M.B. Lond. Pp. 1232. £2 2s.
Surgical Pathology and Morbid Anatomy. By Sir Anthony A. Bowlby, K.C.B., K.C.M.G., F.R.C.S., and Sir Frederick W. Andrewes, M.D., F.R.S. 7th ed. Pp. 651. 30s.

Communications, Letters, &c., to the Editor have been received from—

A.—Air Ministry, Lond.; Earl of Athlone and the Council of the Middlesex Hospital Medical School, Lond.
B.—Messrs. Baillière, Tindall, and Cox, Lond.; Brig.-Gen. W. W. O. Beveridge; Dr. G. Blacker, Lond.; *British and Colonial Pharmacist*, Lond., Editor of; Messrs. Butterworth and Co., Calcutta.
C.—Dr. W. Calwell, Belfast; Dr. W. K. Calwell, Lond.; Mr. R. M. Capon, Liverpool; Mr. C. H. Carroll, Lond.; Charing Cross Hospital Medical School, Lond., Dean of; Dr. H. P. Cholmeley, Little Petherick; Civil Aviation, Lond., Dept. of; Mr. P. P. Cole, Lond.; Mr. A. Cooke, Cambridge; Mr. W. T. Cranfield, Lond.; Messrs. J. and A. Churchill, Lond.
D.—Dr. J. W. Dalgliesh, Sutton; Dr. J. A. Davidson, Lond.; Decimal Association, Lond.; Dr. V. Dickinson, Bournemouth; Direct Fish Supplies, Lond.
E.—Dr. J. R. Earp, Lond.; Dr. T. R. Elliott, Lond.
F.—Messrs. Henry Frowde and Hodder and Stoughton, Lond.
G.—Mr. M. P. Gabe, Merthyr Tydfil; Surg.-Commdr. D. H. C. Given, R.N.; Great Northern Central Hospital, Lond.
H.—Dr. H. W. Hales, Norwich; Prof. A. J. Hall, Sheffield; Messrs. Handley Page, Ltd., Lond.; Miss D. C. Hare, M.D., Lond.; Dr. J. R. Harper, Barnstaple; Mr. F. T. Harvey, St. Columb; Mr. J. F. Heather, Scunthorpe; Prof. A. V. Hill, Manchester; Prof. L. Hill, Lond.; Hospital for Epilepsy and Paralysis, Lond., Sec. of.
K.—Mr. D. M. Kelly, Glasgow; Prof. A. F. S. Kent, Manchester; Kent Local Medical and Panel Committees, Maidstone, Hon. Medical Sec. of; Mr. W. Kirkby, Heaton Moor.
L.—Lt.-Col. C. Lane, I.M.S.; Dr. C. Lillingston, Gorleston; London Hospital Post-Graduate College, Sec. of; London Insurance Committee; London (Royal Free Hospital) School of Medicine for Women.
M.—Dr. A. F. MacCallan, Giza; Dr. P. Manson-Bahr, Lond.; Medical Defence Union, Lond., Sec. of; Ministry of Shipping, Lond.
N.—Eveleigh Nash Co., Lond.
O.—Sir J. O'Conor, Buenos Aires; Mr. W. A. Ogilvy, Birstall.
P.—Panel Committee for the County of London; Mr. V. G. Plarr, Lond.; Mr. R. Puppo, Genoa; Professional and Business Women's League, Lond., Sec. of.
R.—Mr. L. B. Rawling, Lond.; Dr. J. D. Rolleston, Lond.; Royal College of Physicians, Lond.; Mr. H. Rundle, Southsea.
S.—Scientific and Industrial Research Dept., Lond., Sec. of; Messrs. Siebe, Gorman, and Co., Lond.; Dr. C. Singer, Oxford; Mr. O. T. M. Smith, Berck-Plage; Mr. H. S. Souttar, Lond.; Dr. G. A. Stephens, Swansea; Prof. W. Stirling, Manchester.
T.—Dr. L. Thorne Thorne, Lond.
W.—Dr. A. H. Watson, Salisbury; Prof. H. J. Watt, Glasgow; Dr. R. Prosser White, Wigan; Mr. A. Willbond, Lond.; Dr. W. J. H. Wood, Southampton; Dr. W. H. Wynn, Birmingham; Messrs. Witherby and Co., Lond.
X.—"X Rays."

Communications relating to the editorial business should be addressed exclusively to the Editor of THE LANCET, 423, Strand, London, W.C. 2.

Notes, Short Comments, and Answers to Correspondents.

ON THE NEED OF A NEW TECHNIQUE IN ANTHROPOLOGY.[1]

By PROFESSOR KARL PEARSON, M.A., LL.D., F.R.S.

WHAT is it that a young man seeks when he enters the university—if we put aside for a moment any social advantages, such as the formation of lifelong friendships associated therewith? He seeks, or ought to seek, training for the mind. He seeks, or ought to seek, an open doorway to a calling which will be of use to himself, and wherein he will take his part, a useful part, in the social organisation of which he finds himself a member. Much as we may all desire it, in the pressure of modern life, it is very difficult for the young man of moderate means to look upon the university training as something apart from his professional training. Men more and more select their academic studies with a view to their professional value.

Prospects of the Student of Anthropology.

We can no longer combine the senior wranglership with the pursuit of a judgeship; we cannot pass out in the classical tripos and aim at settling down in life as a Harley-street consultant; we cannot take a D.Sc. in chemistry as a preliminary to a journalistic career. It is the faculties which provide professional training that are crowded, and men study nowadays physics or chemistry because they wish to be physicists or chemists, or seek by their knowledge of these sciences to reach commercial posts. Even the very Faculty of Arts runs the danger of becoming a professional school for elementary school teachers. I do not approve this state of affairs; I would merely note its existence. But granted it, what does anthropology offer to the young man who for a moment considers it as a possible academic study?

There are no professional posts at present open to him and few academic posts.[2] There is little to attract the young man to anthropology as a career. Is its position as a training of mind any stronger? The student knows if he studies physics or chemistry or engineering that he will obtain a knowledge of the principles of observation, of measurement, and of the interpretation of data, which will serve him in good stead whenever he has to deal with phenomena of any kind. But, alas, in anthropology, while he finds many things of surpassing interest, he discovers no generally accepted methods of attacking new problems: "quot homines, tot sententiæ."

The Type of Student Needed.

The type of man we want in anthropology is precisely the man who now turns to mathematics, to physics, and to astronomy—the man with an exact mind who will not take statements on authority and who believes in testing all things. To such a man anthropometry—in all its branches, craniometry, psychometry, and the wide field in which body and mind are tested together under dynamic conditions—forms a splendid training, *provided* his data and observations are treated as seriously as those of the physicist or astronomer by adequate mathematical analysis.

Such a type of man is at once repelled from our science if he finds in its text-books and journals nothing but what has been fitly termed "kindergarten arithmetic." Why, the other day I saw in a paper by a distinguished anthropologist an attempt to analyse how many individual bones he ought to measure. He adopted the simple process of comparing the results he obtained when he took 10, 20, 30 individuals. He was not really wiser at the end of his analysis than at the beginning, though he thought he was. And this notwithstanding that the whole matter had been thrashed out scientifically by John Bernoulli two centuries ago, and that its solution is a commonplace of physicist and astronomer!

An Exact Technique.

How can we expect the scientific world to take us seriously and to treat anthropology as the equal of other sciences while this state of affairs is possible? What discipline in logical exactness are we offering to academic youth which will compare with that of the older sciences? What claim have we to advise the State until we have introduced a sounder technique and ceased to believe that anthropometry is a science that any man can follow, with or without training? As I have hinted, the problems of anthropology seem to me as subtle as those of physical astronomy, and we are not going to solve them with rusty weapons, nor solve them at all unless we can persuade the "brainy boys" of our universities that they are worthy of keen minds. Hence it seems to me that the most fertile training for academic purposes in anthropology is that which starts from anthropometry in its broadest sense, which begins to differentiate caste and class and race, bodily and mental health and disease, by measurement and by the analysis of measurement.

Once this sound grounding has been reached the trained mind may advance to ethnology and sociology, to prehistory and the evolution of man. And I shall be surprised if equal accuracy of statement and equal logic of deduction be not then demanded in these fields, and I am more than half convinced, nay, I am certain, that the technique the student will apply in anthropometry can be equally well applied in the wider fields into which he will advance in his later studies. Give anthropology a technique as accurate as that of physics, and it will forge ahead as physics have done, and then anthropologists will take their due place in the world of science and in the service of the State.

Francis Galton's Warning.

Francis Galton has a claim upon the attention of anthropologists which I have not. He has been President of your Institute, and he spoke just 35 years ago from the chair I now occupy, pressing on you for the first time the claims of new anthropological methods. In Galton's words: "Until the phenomena of any branch of knowledge have been submitted to measurement and number it cannot assume the status and dignity of a science." Have we not rather forgotten those warning words, and do they not to some extent explain why our universities and learned societies, why the State and statesmen, have turned the cold shoulder on anthropology?

This condition of affairs must not continue; it is good neither for anthropology, nor for the universities, nor for the State if this fundamental science, the science of man, remains in neglect. It will not continue if anthropologists pull together and insist that their problems shall not fail in utility, that their scientific technique shall be up to date, and that anthropological training shall be a reality in our universities—that these shall be fully equipped with museums, with material, with teachers and students.

Planning for the Future.

It is almost as difficult to reform a science as it is to reform a religion; in both cases the would-be reformer will offend the sacrosanct upholders of tradition, who find it hard to discard the faith in which they have been reared. But it seems to me that the difficulties of our time plead loudly for a broadening of the purpose and a sharpening of the weapons of anthropology. If we elect to stand where we have done a new science will respond to the needs of State and society; it will spring from medicine and psychology, it will be the poorer in that it knows little of man's development, little of his history or prehistory. But it will devote itself to the urgent problems of the day.

The future lies with the nation that most truly plans for the future, that studies most accurately the factors which will improve the racial qualities of future generations either physically or mentally. Is anthropology to lie outside this essential function of the science of man? If I understand the recent manifesto of the German anthropologists, they are determined it shall not be so. The war is at an end, but the critical time will be with us again, I sadly fear, in 20 to 30 years. How will the States of Europe stand then? It depends to no little extent on how each of them may have cultivated the science of man and applied its teaching to the improvement of national physique and mentality.

Let us take care that our nation is not the last in this legitimate rivalry. The organisation of existing human society with a view to its future welfare is the crowning task of the science of man; it needs the keenest-minded investigators, the most stringent technique, and the utmost sympathy from all classes of society itself. Have we, as anthropologists, the courage to face this greatest of all tasks in the light of our knowledge of the past and with our understanding of the folk of to-day? Or shall we assert that anthropology is after all only a small part of the science of man, and retreat to our study of bones and potsherds on the ground that science is to be studied for its own sake and not for the sake of mankind?

I do not know what answer you will give to that question, yet I am convinced what the judgment of the future on your answer is certain to be.

[1] Being the concluding section of the presidential address to the Anthropological Section of the British Association.

[2] In London, for example, there is a reader in physical anthropology who is a teacher in anatomy, and a professorship in ethnology, which for some mysterious reason is included in the faculty of economics, and is, I believe, not a full-time appointment.

Mr. W. McAdam Eccles, of St. Bartholomew's Hospital, who has lately removed an "included fœtus" from a male infant, aged 8 months, would be glad to hear of any similar case in which the specimen has been preserved.

PUBLIC HEALTH IN NEW ZEALAND, 1918–19.

IN the report on Public Health and Hospitals and Charitable Aid in New Zealand for the year ending March 31st, 1919, Dr. T. H. A. Valintine, Inspector-General of Hospitals and Chief Health Officer, details his proposals for reorganising and strengthening the department (which include an increase in the number of districts to eight, with 12 medical officers of health), and reviews the general sanitary conditions of the Dominion. A statement of the expenditure borne by the Government in connexion with the influenza epidemic shows that the total amounted to £182,659. In addition to this a sum of £75,374 has been allotted as an annual relief to widows and orphans, and in some cases widowers with children. There was an increase in diphtheria and cerebro-spinal meningitis during the year under review, but scarlet fever, enteric fever, and tuberculosis showed decreased prevalence.

The pandemic of influenza prevailed in New Zealand with considerable severity in November and December, 1918. In these two months 5471 deaths were directly attributable to this disease, the provinces of Auckland and Wellington suffering most, with 3127 deaths between them. Dr. R. H. Makgill, district health officer for Auckland, who makes a special report on the subject, states that there were two distinct waves of infection, the first reaching its maximum about August or September, with an abnormal but not alarming mortality, the second developing in the first two weeks of November, with a virulence far in excess of anything that had hitherto been experienced. This "division into first and second waves, with undue morbidity [fatality] of the second wave, was experienced all over the world, and the greatest intensity of the second wave was almost synchronous in countries so widely separated as Britain and New Zealand." Alluding to the fact that, "whereas in ordinary epidemics the power fails as the wave recedes, this one showed a recrudescent power," Dr. Makgill remarks that there is nothing stable about the virulence of an infective organism, and this applies to the influenzal group as to others. The conditions were very favourable to the spread of disease.

"Huge bodies of men gathered together in training camps throughout the world, and then hurried overseas in conditions of unavoidable overcrowding, and the concentration in Europe of these overseas bodies of men has never occurred before on such a scale. The massing together of recruits drawn from country districts has produced an ideal field for the cultivation of infective organisms, since these men have not had time to acquire immunity to these organisms."

Popular opinion attributed the outbreak to the arrival of the mail steamer *Niagara* with many cases on board, but Dr. Makgill shows good reasons against this view.

The low degree of resistance to pneumonia among New Zealand troops has been demonstrated in Britain. Dr. Makgill considers this to be—

"probably the result of the general healthful condition of life and climate [in New Zealand], whereby our population fails to acquire that natural immunity to disease of the type which the slum-dweller derives from constant struggle with invading organisms. It is doubtless to this that we owe the very violent character of the outbreak."

This is an argument that seems to cut both ways. Is the slum-dweller likely to have a greater resisting power to infection *generally* than the countryman? Of the total 5471 deaths from influenza, 2719 occurred in persons between the ages of 25 and 40; that is, 49·71 per cent. of the deaths in 23·88 per cent. of the population. The actually highest ratio was in the age period 30 to 35 (1010 deaths, or 11·19 per 1000 in 8·18 per cent of the population). Males suffered much more than females (6·49 compared with 3·48 deaths per 1000); this agrees with the general experience. In the age groups from 25 to 40 the deaths numbered 1826, or 52·36 per cent. of male deaths in 22·03 per cent. of the male population. Among females between 25 and 40 there were 893 deaths, or 45·43 per cent. of female deaths in 25·64 per cent. of the female population.

The progress of the epidemic is clearly described, and the increase in virulence emphasised.

"To the student of bacteriology there is nothing inconceivable in the possibility of an organism, by rapid transference from case to case under favourable surroundings, being changed from a harmless saprophyte to a very virulent infective parasite."

Though not always recognised, this is eminently reasonable in regard to many of the specific infections, the causative organisms under certain conditions developing a progressively increasing infective power. Dr. Makgill traces the relationship between the first and second epidemic waves, and describes the preventive measures adopted. Systematic treatment by the use of weak solutions of zinc sulphate in an inhalation chamber was found during two and a half years' experience in the military camps to be highly satisfactory; the proportion of "severe" cases was reduced from 50 per cent. to 22 per cent. among men who were treated daily for three successive days. "Frequent washing out of the nose and mouth with simple salt solution is probably as valuable a family remedy as any which can be suggested."

"THE DOCTOR'S REFERENCE LIST."

A CONVENIENT little book for keeping on the consulting-room table is provided by "The Doctor's Reference List," now in its eleventh edition. Addresses of homes and hospitals for special cases, convalescent homes, inebriate retreats, sanatoriums, private asylums, nursing homes, and benevolent institutions are classified and indexed for ready reference; summaries are included of the Inebriate, Lunacy, and Insurance Acts, as well as other enactments which affect the medical man in regard to the advice which he may give his patient. The value of the book would be increased by careful revision. Names of secretaries are still given who have vacated office by death or other causes. The scope might usefully be widened to include schools for mental defectives, welfare and venereal centres, and similar institutions. The publishers are Messrs. George Pulman and Sons, Thayer-street, London, W., and the price is 1*s*.

MINERS' SAFETY LAMPS.

MISUNDERSTANDING may possibly arise from our reference to the illumination from safety lamps in an annotation on Nystagmus (THE LANCET, Sept. 11th, p. 562). The light from these lamps certainly becomes less as work proceeds, but this is due rather to an indirect than a direct effect of coal-dust. Dust clogs the gauze which is above the glass cylinder in front of the flame; this clogging interferes with the ventilation of the lamp and so affects the flame. The glass cylinder becomes less transparent owing to deposition of smoke from a flame which is not burning brightly.

SALVIA OFFICINALIS.

SAGE has been credited with many medicinal virtues, and as a popular simple is still used by country folk, though it is not now officially recognised in the British Pharmacopœia. Among its reputed uses were those of a gargle for sore-throats and a cleanser of the teeth, and Mrs. Grieve, of "The Whins" Medicinal and Commercial Herb School and Farm, Gerrards Cross, who has compiled a very interesting pamphlet on the healing virtues of the sage, suggests that the plant might be tried in pyorrhœa. The salvia was so esteemed in time past as to give rise to the monkish line:

Cur moriatur homo cui salvia crescit in horto?—

a variant of the old English saying:

He that would live for aye
Must eat sage in May.

Mrs. Grieve deals with the cultivation of the plant, its preparation for market, chemical constituents, use in medicine, and the preparation of food, and includes some account of other members of the great labiate order. The price of the book is 7½*d*. post-free from the author.

THE EFFECT OF CASTRATION ON UTERINE CONTRACTIONS.

THE effects of castration on the automatic movements of the uterus in the guinea-pig have recently been studied by Mons. Athias, of Lisbon, and in the *Journal de Physiologie et Pathologie* he describes the results obtained by observing the movements of the excised uterus in well-oxygenated Tyrode's fluid—akin to Ringer's fluid—kept at 35° C. The uterus in new-born females shows almost no automatic movements; when excised the uterus contracts and slowly relaxes. The motor functions become distinct a month after birth, the movements beginning 10–20 minutes after the preparation is placed in the nutrient fluid and lasting for 24–48 hours. The movements of the surviving uterus show three periods. There is an initial contracture, during which the relaxed muscle shows contractions which steadily decrease; in 2–6 hours this passes into a period of relaxation, when, as the tonus diminishes, the contractions become more marked and more regular, lasting 24–48 hours; there follows a period of increased tonus which precedes final termination of the contractions. There is no fundamental difference between virgin and previously pregnant uteri. The uterus of the later stages of pregnancy and of parturient animals show specially powerful contractions. In 23 animals of different ages—virgin and previously pregnant—double ovariotomy was performed. During the first 4–6 months after the operation no difference was noted. Only after 9 months, when the activity of the excised uterus showed changes, was atrophy observed. The initial contraction then lasted longer, and the period of relaxation was considerably diminished; the contractions were small and scarcely perceptible, and the terminal period was shortened. The atrophy of the uterus and the accompanying diminished activity occurred considerably later when the animals were castrated during or immediately after pregnancy. In five animals—5–34 days after castration—the ovaries of other females were grafted subcutaneously. In these cases the function of the uterus remained as long as functional ovarian tissue was unabsorbed, which, according to the author, might be for a period of 2–3 years, but the ovarian tissue may disappear within 20 months. It would seem, therefore, that the presence of the ovary is essential for the maintenance of the normal function of the uterus.